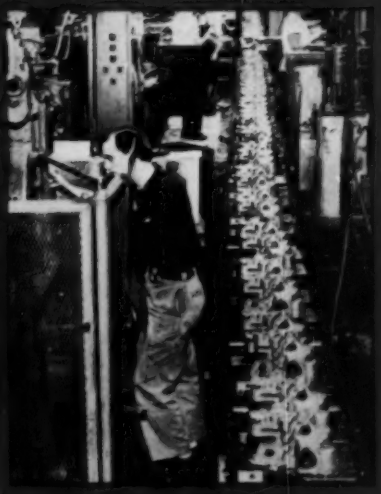
OVERSEAS EDITION
JUNE 1955

McGRAW-HILL DIGEST

INTERNATIONAL BUSINESS AND INDUSTRY



DO PEOPLE BUY your product on its merit alone? Or are there other reasons? Market research finds out p13

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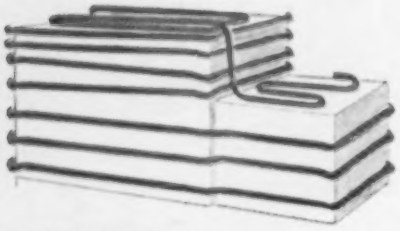
SPOT WELDING from one side means these benefits: fast fabrication, low fixture costs, high strengh p38

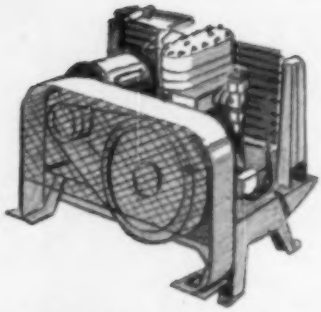
INCENTIVE PLAN reflects the plant's productivity. The basic idea: as the company's productivity goes up, so do employee's earnings p42

BUNDY TUBING COMPANY

FROM *the Bundy Sketchbook*
TO *jog a designer's imagination*



COILS FOR HOME FREEZER



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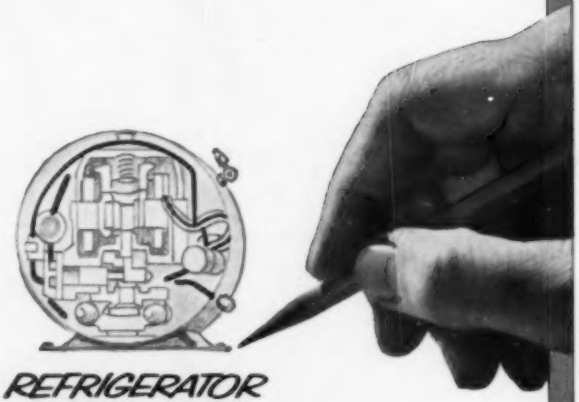

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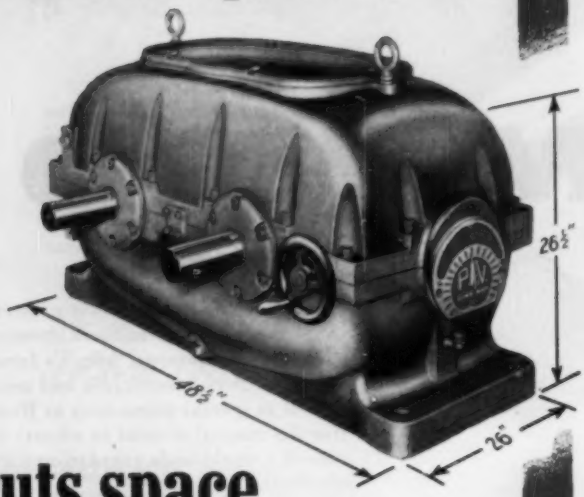

cuts space requirements up to 50%

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Get the facts on the Size 6 from your Link-Belt representative, or write us direct. You'll receive a copy of Folder 2374. And for information on the complete P.I.V. line, ask for Book 2274.

P.I.V. LINK-BELT VARIABLE SPEED DRIVE

13.504-E

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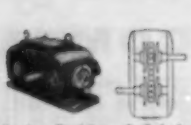
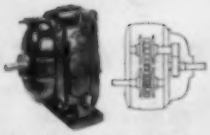


Basic, Positive, Infinitely Variable (P.I.V.) Speed Drive.



P.I.V. with single reduction input or output helical gears.

Motorized P.I.V. with single reduction input and output helical gears.

Motorized P.I.V. with single reduction input and double reduction output helical gears.

McGRAW-HILL DIGEST

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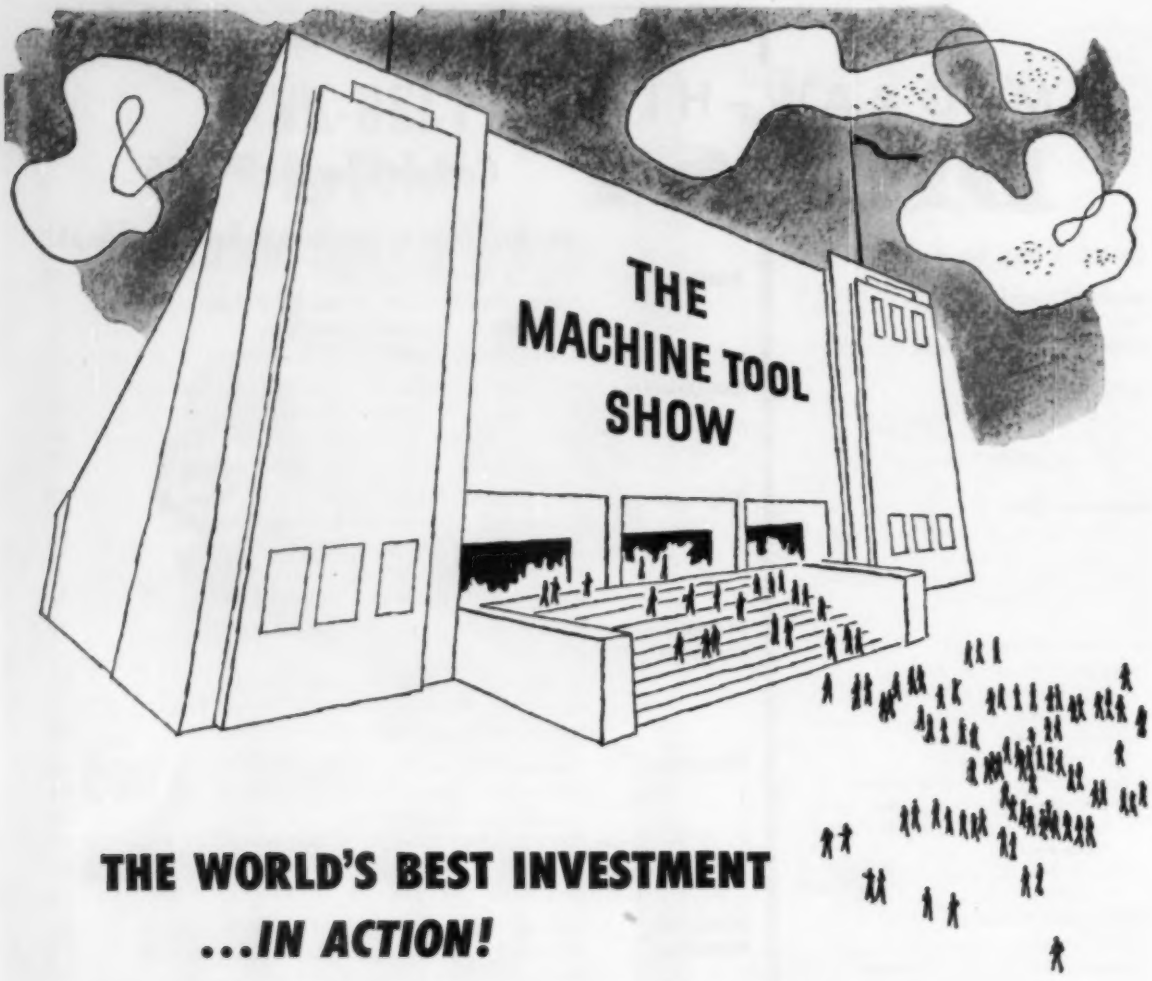

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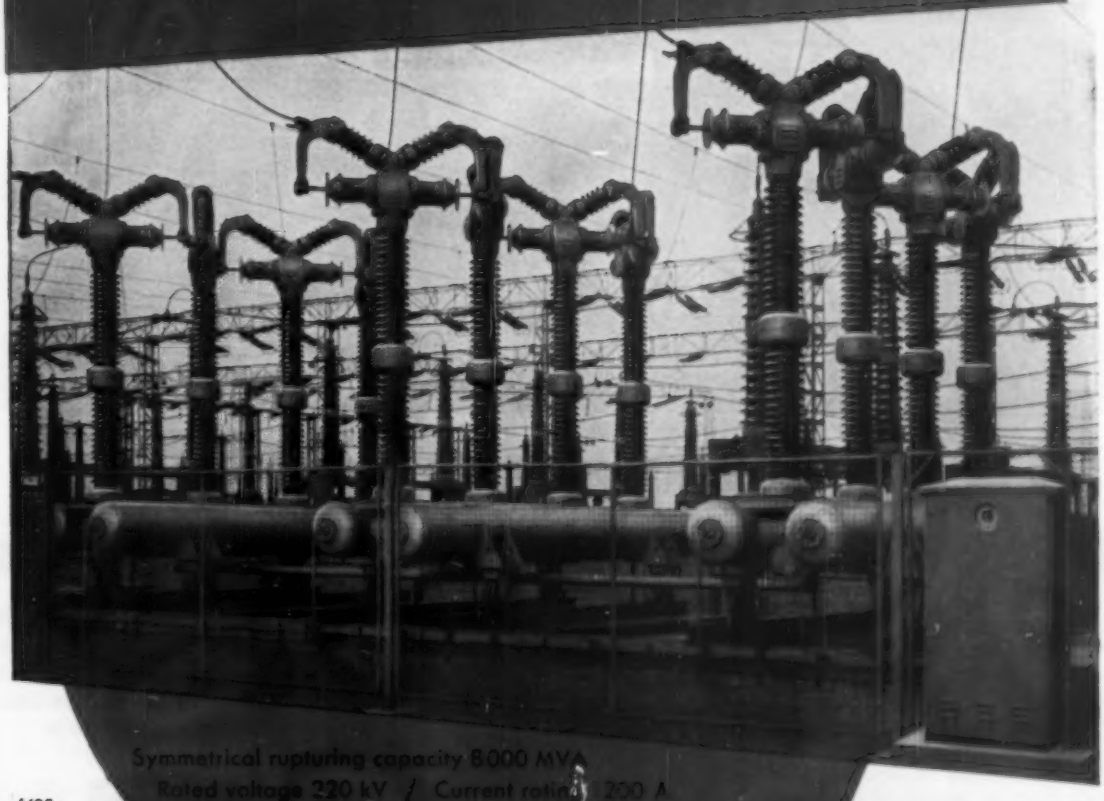

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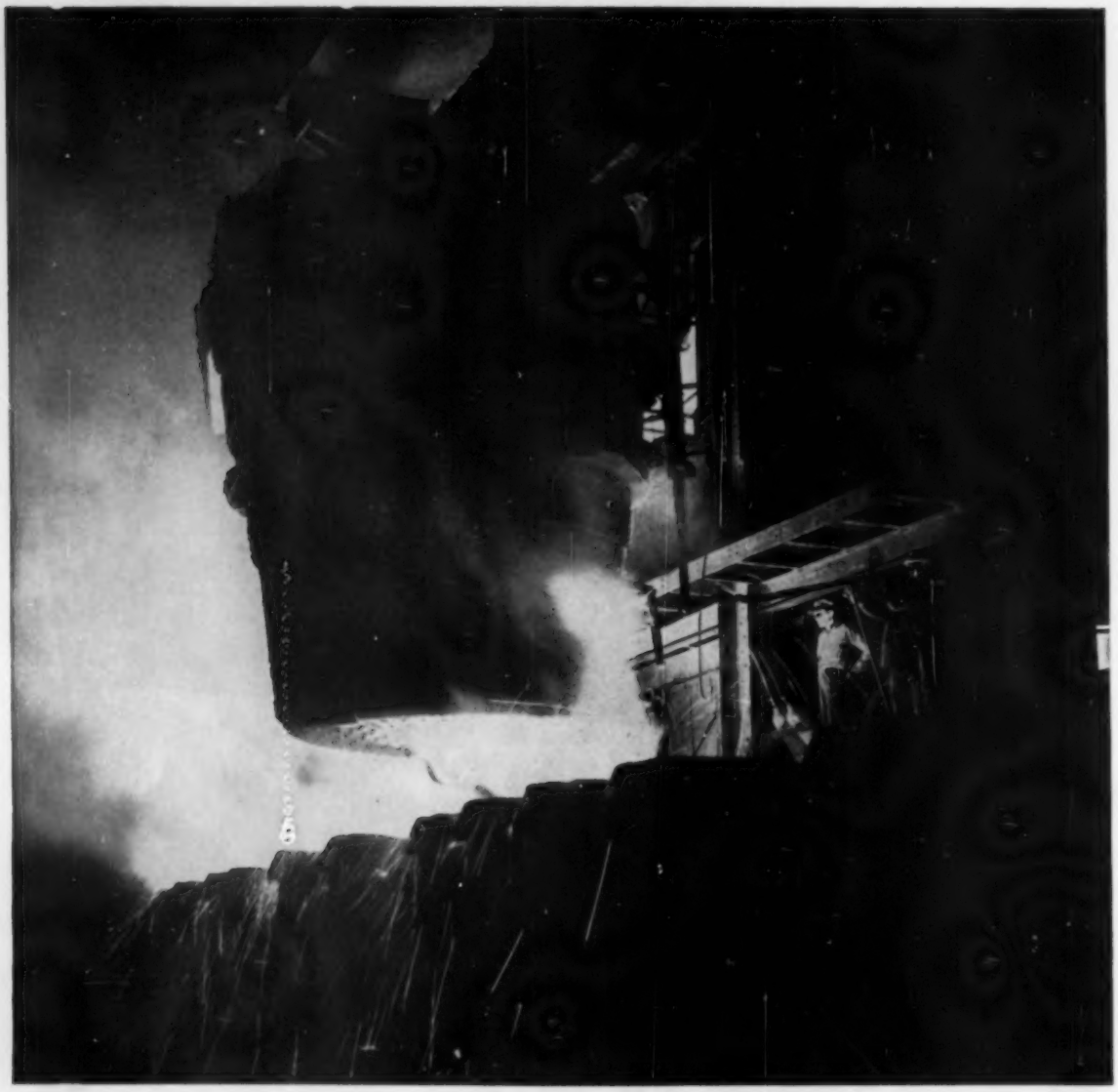

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U. S. BUSINESS TRENDS

PROSPECTS ARE GOOD . . .

. . . for the second half of 1955. Certain segments of the economy will level off, but there is a good chance that, for the 12-month period, 1955 may be a record year. First-quarter figures—the latest complete set available—indicate the trend.

Automobile production and housing starts will slow down. But this will be largely the result of extraordinarily heavy production during the first half. Both industries are healthy enough to withstand seasonal slumps.

Industrial production at the end of March stood at 135% of the base period of 1947–49. This is better than it looks. The record industrial production rate of 137% in 1953 had the impetus of peak defense production behind it. Today that is down. **But the U. S. may well produce more civilian goods in 1955 than at any time in its history.**

Will consumers buy the output of industry? The answer seems to be a resounding yes. Consumers are spending more than ever before. And there are strong indications that they will continue to spend for the rest of the year. Behind this lie two factors:

For one thing, people have more money to spend. Disposable income, as predicted by the McGraw-Hill Digest (Jan, p4) is up $8-billion at an adjusted annual rate. This adds up to a record high. At the end of March, disposable personal income stood at a $260-billion rate.

The other force is consumer attitude toward spending. And a recent survey of attitudes shows that consumers intend to buy more durable goods in 1955 than in 1954. In the past, consumer optimism has meant a real boom in spending . . . and this year's survey is the most optimistic since 1953. Note also that buyer attitudes and incomes depend to a considerable degree on industrial production and industry's investment in production.

BUSINESS WILL SPEND 5% MORE . . .

. . . for plants and equipment in 1955 than in 1954. Manufacturing companies will increase capital spending 3%. In total this will mean more capital investment than in any year in the past.

The rising trend of capital spending may well carry far beyond 1955, judging by industry's present plans. The McGraw-Hill Department of Economics, in its annual survey of business plans for new plants and equipment, finds that preliminary plans for 1956 are only about 3% lower than plans for 1955. In the past, plans for future years have always been sharply lower than those for the current year.

If preliminary plans are revised upward . . . as they have been in the past . . . 1956, 1957, and 1958 will be years of high, and perhaps record, capital expenditure by business.

Plans for investment are based on estimated sales. **Manufacturing companies expect their sales to increase by an average of 7% in 1955 and 21% over the 4-year period, 1954–1958. To meet this increased demand, they will add 5% to their productive capacity this year and another 11% by the end of 1958.**

Largest increase in capital expenditures this year will be by commercial companies . . . those in the trade, finance, construction and service industries. Their outlays will rise about 15%.

Spending plans definitely reflect the growing confidence of business. Last fall, iron and steel companies planned a 3% cut in the capital investment. Now they plan a 29% increase.

Most of the manufacturing companies surveyed by McGraw-Hill expect their new equipment to pay for itself in between 3 and 5 years.

THE U. S. ECONOMY WILL EXPAND 29% . . .

. . . in the 1950–1960 decade, according to a study recently completed by the Twentieth Century Fund.

In dollars, this would mean a gross national product in 1960 of $414-billion (as against a probable $368-billion for 1955). The analysis assumes the requirements of a peacetime economy and makes no allowance for a stepped up defense program.

Higher production will mean higher incomes and spending. But greater over-all wealth will have the effect of raising the standard of living. And, in these terms, the Fund expects that there will still be deficiencies.

Changes, however, will not be limited to increases in the volume of output. **There will also be major changes in the way people live and work. Improved technology will shorten the work day and the work week.** But more important, the day's work promises to be less fatiguing, more varied, and more interesting.

Taking a long look at the future, the Fund finds that: **If productivity keeps increasing at the present rate, man will do . . . 100 years from now . . . the same work in 1 day that now takes a week.**

Modern machines that lower the cost of metals, minerals

Steel, cement, coal and other essentials of good living are better in quality and lower in cost, thanks to the efficiency of modern processing equipment. The Allis-Chalmers machines on this page are examples:

GYRATORY CRUSHER

These crushers break up huge chunks of ore and rock as easily as you might crush peanut shells. Large crushers can process thousands of tons of ore a day.

SOLIDS HANDLING PUMP

These pumps move slurries—mixtures of solids and liquids such as coal and water or sand and water. Some of these pumps are lined with rubber which far outwears metal when handling abrasive material.

VIBRATING SCREEN

Screens are essential equipment for efficient processing of coal, ore and rock products. Screens are used to grade products to uniform sizes and also to remove excess water.

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INTERNATIONAL TRENDS

WASHINGTON—

This year's $3.5-million request for foreign aid, now before the Congress, is radically different from its predecessors. President Eisenhower, in effect, is asking the Congress to recognize that foreign aid has become a permanent tool of U.S. foreign policy.

Two specific requests show the difference: (1) The conversion of the temporary Foreign Operations Administration into a permanent semi-autonomous agency of the State Department. (2) The request for a $200-million regional development fund to be spent over an indefinite period of years instead of in 1 year as in the past.

President Eisenhower's foreign-aid message states explicitly that **the administration now thinks of the mutual assistance program as permanent, not as a stopgap for meeting passing crises.** The new concept of foreign aid as a permanent instrument of foreign policy has grown up gradually. It has been forced on the administration by the pressures of history. The postwar economic crisis in Europe forced the Marshall Plan. The military crises in Korea and Indochina led to the military-aid program. Now the economic challenge of Communism in Asia is forcing the U.S. to aid economic development.

Asian aid plans now call for spending between $1- and $2-billion a year for economic development for at least 10 years. Technical assistance in Latin America and Africa will cost roughly another $200-million indefinitely. Add a minimum of $2-billion military aid just to maintain existing allied forces, and you see why the aid program looks permanent.

UNITED NATIONS—

The UN Economic and Social Council will prepare a major study on international commodity trade.

Delegates of the member nations have become increasingly aware of the impact of commodity market fluctuations on world economies.

In its final recommendations, the commission may make certain proposals aimed at stabilizing world commodity markets. Some form of parity payments to be backed by the International Bank could be suggested at that time.

A similar scheme was proposed at the Pan-American Conference held last year at Caracas. In spite of fluctuations, however, raw-material producers have had a healthy market over the past few years (McG-H Digest, Jan, 34).

WORLDWIDE—

The year 1955 will be characterized by extensive development both in industry and agriculture. Reports from the following countries indicate the trend.

Mexico City: Mexico's President, Ruiz Cortines, has inaugurated a new hydro-electric plant in west central Mexico. The new plant will generate 52,000 kw.-hr.

Berlin: West Germany's electrical industry is expected to spend about 400-million marks this year in the form of capital investment for its production installations. The demand for electrical goods that has arisen since 1948 has forced industry expansion.

Oued El-Abid: Inauguration of a new Moroccan flood-control and irrigation system will be a major point in the growing industrial and agricultural development of the French protectorate. Under construction since 1941, the system will revolutionize economic life in an area that has been mainly inhabited by nomadic tribes. French authorities predict major economic developments in the area.

Buenos Aires: Argentina has recently put into action a plan aimed at an all-round improvement of industrialization methods and raising of the standard of living. The plan will involve heavy capital expenditures and new management procedures.

HELSINKI—

A unique savings account system will be adopted by leading banks in Finland. The accounts, claimed to be "inflation-proof," are tied to the country's cost-of-living index.

The accounts provide for a 2% increase in the deposited principal for every 2% rise in the cost-of-living index above the level of October 1954. In addition, the accounts will draw interest at the rate of 4¾%.

Government officials have been sharply critical of the measure, which they claim is inflationary in itself. Counter-measures against the private banks have been threatened. **It is probable that the government will impose a special tax on the accounts.**

The accounts must be maintained for 1 year, and a minimum deposit of 30,000 Finnmarks (about $135) is required.

Finnish banks will also consider the use of cost-of-living index clauses in certain loans.

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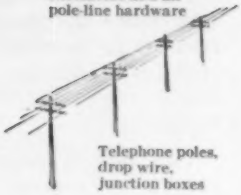
Insulators and all pole-line hardware

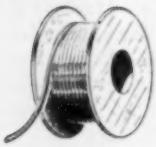
Telephone batteries and standby power supplies



Telephone poles, drop wire, junction boxes

Teleprinters

Carrier wire transmission systems



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Modern automatic dial telephone exchanges—for communities of any size from the largest to the smallest—are provided complete to the last detail by ISE. But ISE service goes far beyond that—covering every conceivable need of a modern communications system. Included are such specialized equipment as microwave point-to-point links, carrier and other multiplex systems and teleprinter networks—as well as the telephone wire itself, the poles on which it is strung and all the tools, accessories and materials required. Look to ISE for everything—everything behind your telephone.

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The solution found by the Henri Funck Brewery may help you

Brewer rolls out *bills* fast as beer!

Triples billing output —eliminates errors

Customers got their beer without delay from the Henri Funck Brewery in Luxembourg, thanks to a modern bottling system installed to meet increased demand. But stepped-up production meant more accounting, more bills to send out. With accounting methods then in use, bills were often as much as two weeks late.

Determined to speed up their billing, management called in the local Burroughs man. Together they worked out a system using Burroughs typewriter bookkeeping machines.

Result? Burroughs machines have tripled billing output. Accounts are kept up to date, bills are always out on time. Errors in the accounting department have been virtually eliminated. In addition, the machine has solved the problem of accounting for empty deposit bottles.

Can your business profit from faster facts? Your *local* Burroughs man knows modern business machine methods, offers expert service. For his address, write: Burroughs Corporation, Detroit 32, Michigan, U.S.A.

"Your machines pay for themselves," Mr. A Staudt, *center*, of the Henri Funck Brewery tells Mr. E. Boonen, *left*, the Burroughs man. *Burroughs means better business.*

Call in your local Burroughs man

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Germany

JUNE 1955
VOLUME 10 • NUMBER 6

Mc GRAW-HILL
DIGEST

The Case of the Unbought Coffee

When instant coffee failed to sell on the U.S. market in spite of improvements in packaging and flavor, manufacturers sensed that resistance to the product lay deeper than conventional studies showed. To get at the underlying reasons, one manufacturer called in Mason Haire, an expert in motivation research.

Initial studies elicited the simple response, "I don't like the flavor." This Haire felt was too easy an answer; that it was being used to get rid of interviewers and conceal a more basic objection.

In order to probe deeper, Haire asked 100 women to write a description of a woman's character from her shopping list. Research specialists had prepared two lists in advance. One list included instant coffee, the other, drip-grind. Otherwise they were identical.

Results of the study showed that women who bought instant coffee were viewed differently from those who bought the conventional drip grind. Among the comments on "the woman who ordered instant coffee": she's lazy . . . spendthrift . . . a poor wife . . . fails to plan well for her family.

From this reaction, researchers could deduce that a number of women feared being characterized this way themselves if they bought instant coffee.

In their descriptions, however, the 100 women did point out that instant-coffee users might be: efficient . . . economical . . . busy. These clues formed the basis for several constructive advertising suggestions that did much to improve product acceptance.

What Makes Buyers Buy?

Manufacturers and distributors are finding that buyers' selections are dictated by more than just product merit.—An original Digest article

TODAY'S TOP BUSINESS EXECUTIVE is more navigator than pilot. His biggest job is charting the predictable future of his company. As world business grows bigger and more complex, this responsibility is growing with it. As a result, management men are continually seeking new tools and improving old ones in an effort to make their predictions more accurate and their businesses more profitable and secure. One of these tools is market research.

Strictly speaking, market research is far from being a new weapon in the management man's arsenal. But it is one that has recently come in for a great deal of polishing.

Reduced to fundamentals, market research is a process for measuring a market's ability to absorb a given product, the trend of the market, and the preferences of buyers. It is the techniques for arriving at this information that have made the biggest strides.

Basic in any program of market research is a close study of the existing market and the position of the company in that market. Here one is working with a highly realistic estimate sometimes known as "sales potential." It is economically conceivable, for example, that the U.S. could absorb almost untold quantities of toothpicks. It is unlikely, however, that it will.

The starting point of market research, therefore, is a factual analysis of how many units the market can absorb, based on present consumption. (To this can be added an estimated increase if new uses for the product can be found.) Against this sales potential, the company can measure its current performance.

This information alone will frequently reveal a number of unsuspected facts. If, for example, the company finds that it is not getting a reasonable share of the total current market, it will immediately be alerted to the need for further study of such factors as profit margins, distribution costs, or even production costs. Any of these or a number of other problems may be acting as a brake on sales.

The company's current position in the market having been determined, the next step is to evaluate the over-all trend of the market as a whole. A surprising number of companies become so involved in the day-to-day conduct of business that they lose sight of the direction their market is taking. They overlook the long-term trend.

A classic example involved a manufacturer of women's hairpins who, in the early 1930's, dumped his entire inventory of hairpins into a vacant lot, locked his doors, and went into bankruptcy. The vast majority of

"... more is needed to know why a consumer will buy ..."

American women at that time had decided to bob their hair.

A study of his market, however, would have shown the manufacturer that the trend toward shorter hair had started a full 7 years before. And a little more study of consumer preferences would have shown him an entirely new market for a redesigned pin, the so-called "bobby pin."

You Can't Just Ask

But in recent years, market researchers have found that they can't just go out and ask consumers what they prefer. The reason for this is that the consumers themselves don't know.

For one thing, potential buyers frequently have difficulty visualizing the product as described by an interviewer. Or they will discuss design without any relationship to practicality or cost. To offset this, manufacturers are now beginning to show consumers pre-production models of the real thing.

Borg-Warner, for example, approached the problem in the U.S. by setting up clinics across the country to study consumer reaction to several stove designs. Contemplated models in mockup form were put on display, and women were asked to see, feel, and examine them. Reaction to design advantages were weighed against reaction to consequent prices, and the results were correlated as a guide to future production programs.

While techniques like this answer the researchers' questions as to *what* a consumer will buy, still more is needed to know *why* a consumer will buy . . . or why a consumer will not buy . . . as in the case of instant coffee. And this, an increasing number of marketing men feel, is vital information. To fill the vacuum in their knowledge of buyers, researchers are digging deeper into the prospective customer's basic motivations.

From a strictly business standpoint, this type of study is not nearly as impractical as it might first appear. Nor is this research into entirely uncharted territory.

As a point of departure, it is generally recognized that the element of choice is playing a larger and larger part in consumer buying habits. The true monopoly being practically non-existent, the prospective buyer is compelled to select his purchases from a number of competing brands. And today's advertising, with its conflicting claims, is making that selection more difficult.

To proceed from this point, however, requires an examination of fundamental human incentives, drives, and taboos. There are literally hundreds of theories concerning these basic human factors, but the analyst who studies them carefully will find that there is some common ground.

The decision to buy one of several products is not an instantaneous event that springs fully formed from the mind of man. Rather, it is a process with identifiable parts. Before the decision comes a choice between comparable items; this choice in turn is based on a large number of conscious and subconscious influences, many of which are totally unknown to the buyer, but which nonetheless help to dictate his decision.

Take the case of wine marketing outlined in the book, *Motivation Research in Advertising & Marketing*, published by McGraw-Hill for the Advertising Research Foundation.

Investigators have found that wine drinking in the U.S. differs from whiskey drinking in that wine is not used to bring on a festive mood but rather to *express* a festive mood. Tests show that U. S. wine drinkers have a feeling of self-indulgence . . . "of being good to themselves." And as consumption grows, it is losing some of its connotation of sophistication or foreignness.

On the other hand, wine advertising faces certain definite problems that it must overcome. Most people feel insecure about wine. They feel that there is too much to know about it, and this sets up a marked psychological resistance. In consequence, they feel irritated about wine. The number of possible choices makes them unhappy.

Advertising Research Foundation makes some specific suggestions to wine advertisers as a result of these surveys. Advertising should be aimed at the buyer's insecurity and should relieve people of the responsibility for knowing all about the many vintages and kinds of wines. Consumers should be urged to relax and enjoy the wine that pleases them most.

How are these results and deductions arrived at? There are several methods. But almost all of them have one thing in common. They avoid asking people directly what they think.

But if people object to divulging their own feelings (or objections), they are often quite willing to discuss someone else's. This has given rise to what is known as the *projective* technique.

Let's assume that you are interested in finding out how people really feel about two-seater sports cars. If you ask a man why he doesn't buy one, he may tell you that he needs a bigger car; or "he is considering it," or he will give some other non-committal answer.

You Have To Be Devious

But if you ask as your first question, "What do you think of people who drive sports cars?" you may find that he believes them to be snobs, or irresponsible, or "fast," or any of a multitude of other things. It is a strong probability that he will describe his own *private* reasons for not buying a sports car himself. And you will have a key to the problems you must offset with your advertising.

Tracking down the varied and often obscured motivations that influence buyers is a specialized job and one that is still in its infancy. But in today's highly volatile and competitive markets, businessmen are forced to study more and more of the factors that lead up to the critical moment when a consumer says, "I'll take that one."

The evidence is strong that marketing research will play an increasingly important part in management's decisions.

EXPANDABILITY of Beckman Instruments' plant is assured by plenty of growth area surrounding present plant.

THIRD MORE SPACE, new bays across front for services were obtained when Douglas Aircraft renovated old plant.

The Best U.S. Plants of 1954

DIGESTED from Factory Management & Maintenance, Apr, Part Two, pA1—Each year *Factory's* editors study plant buildings in the U. S. Out of the information collected emerges a clear picture of trends in plant layout and design. These are some of the features.

Buildings and Grounds

When Beckman Instruments, Inc. (Fullerton, Calif.) set out to consolidate its 18 separate production locations into a new plant, it aimed at building a plant flexible enough for over-night changes in production layout, expandable enough to meet almost any demands for increased production. Beckman is in a rapidly growing industry—industrial controls. It needs expandability and flexibility.

Flexibility is guaranteed by what the company calls "seed area expansion." Some plant equipment —punch presses, turret lathes, optical grinders—is immovable. Areas containing this equipment are labeled "seed areas." Surrounding each seed area is an "expansion area," which is presently occupied by easily moved equipment.

For example: If an expansion of punch-press facilities is needed, they can be expanded into the area now occupied by drill presses, which are easily moved into still another area.

Beckman is ready for any expansion. The plan is already drawn for expansion of the plant to three times its present size. Present plans call for expansion by separate buildings duplicating the existing manufacturing department. Or the present main manufacturing building can be added to with little difficulty.

Douglas Aircraft Co., Inc., needed more plant facilities to meet stepped-up aircraft production schedules at its El Segundo, Calif., plant. So it took over a nearby unused aluminum plant spread over 214 acres. Douglas acquired 11 parallel buildings, each 740 ft. long and 50 ft. wide. Between buildings were unroofed courtyards 57 ft. wide. There were many other buildings scattered over the property—all in bad repair.

Douglas relocated some of the old buildings. The 11 parallel buildings had their courtyards roofed over. This conversion created integrated production flow areas 150 ft. wide, 740 ft. long. Basements in these buildings store tools, dies, supplies, raw materials, and finished parts.

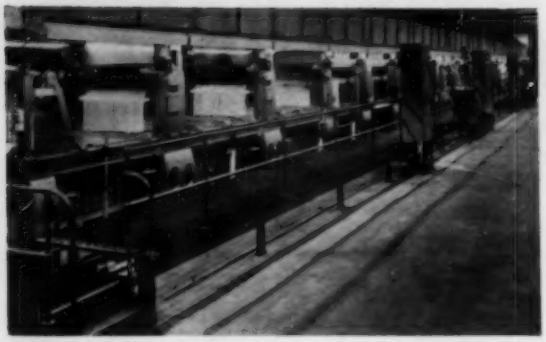
Electrical Services

Coats & Clark Inc. (Toccoa, Ga.) built its entire plant around one machine — a warp mercerizing range nearly 600 ft. long. The company's business is finishing thread. The plant's outstanding feature is its electrical system. It combines flexibility with simplicity.

A single incoming feeder brings power into the plant at 44,000 volts. A master substation cuts this down to 4,160 volts for in-plant distribu-

CONTROLS are part of 150-kw. high-frequency generator (foreground) in Adamas plant. Panels are removed.

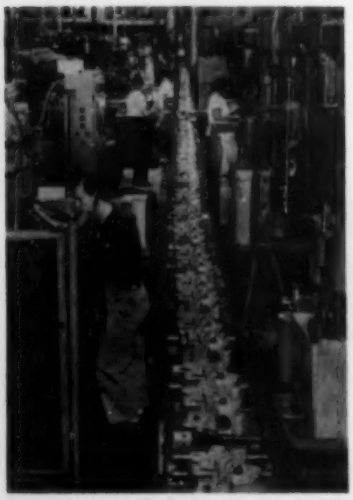
UNIT SUBSTATIONS are located in basement of Coats & Clark plant. Equipment served is directly above.



HEART of Coats & Clark's new plant is this warp mercerizing range. Entire plant was built to accommodate it.

PLANT EXTERIOR (Robertshaw-Fulton) has flagstone trim, large glass areas. Property is completely landscaped.

EXPANSION PRINCIPLE is evident in Beckman Instruments' plant. Lathes (foreground) expand across aisle.



PRODUCTION AREA in Hamilton Standard plant permits easy shifting of production lines to meet needs.

tion. Six unit substations tie in with the master substation through a looped circuit. Five of the six substations are located in the basement. This provides freedom to rearrange plant facilities.

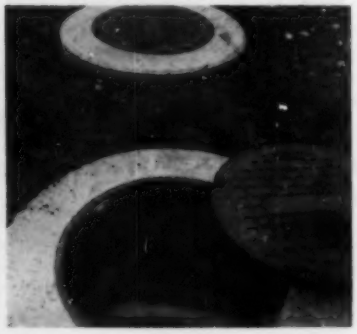
Motors are installed in fixed group patterns. Fourteen motor control centers are used. No control center is more than 25 ft. from its unit substation, which is usually almost directly below in the basement. These are the advantages: low installation cost, easy expansion, central operation, easy maintenance.

Plant Services

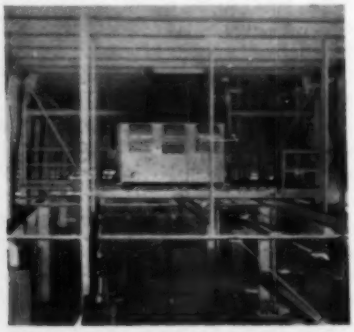
General Electric Co.'s Appliance Park (Louisville, Ky.) is a big plant. Its five main buildings (each makes home electrical appliances) provide 4.2-million sq. ft. of manufacturing space. And there is plenty of room for future expansion. Plant services were planned for the biggest plant GE could foresee. Basic services are in three stages of development:

1. All parts that would be difficult or impossible to expand are now sized for maximum expansion.
2. Those parts that can be readily expanded are sized for existing demands, plus a safety margin.
3. Feeders from the main utility loop to the machines are installed only as the need arises. Each pipeline on the loop is fitted so that it can be quickly tapped.

When Adamas Carbide Corp. (Kenilworth, N. J.) decided to build a new plant, it turned planning over to department supervisors. Each supervisor was asked what he thought his department should be like in the new plant. Then all departments were integrated into a final layout for best over-all plant operation. The company's operation is a small one so it had to watch costs closely. But it insisted plant services be given top priority.



DOUBLE MANHOLES at Eli Lilly plant cut pulling of underground cables. Partition separates manholes.



FRESH AIR, sucked in by 22 intakes like this one in IBM plant, replaces hot air exhausted by roof monitors.

MaK

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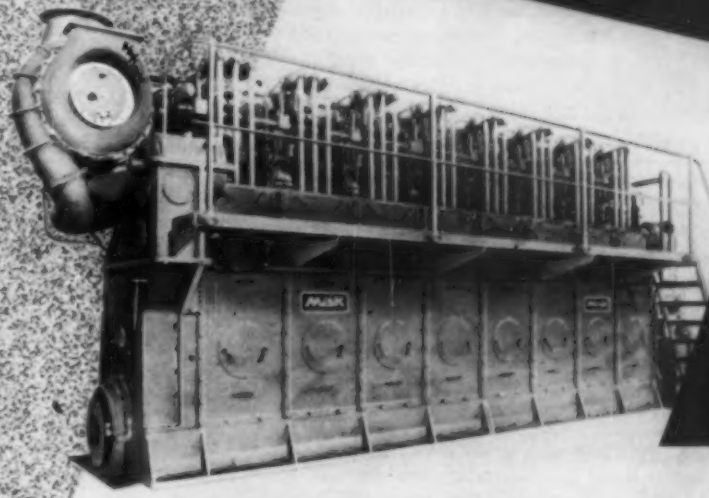

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FOR SHIP PROPULSION AND
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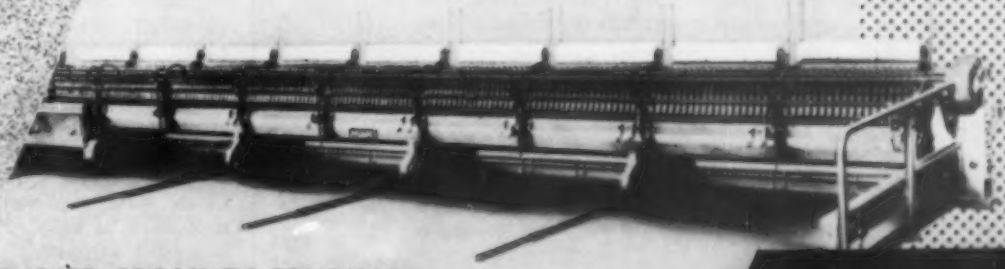
MARINE ENGINES
MARINE AUXILIARIES
DIESEL PUMPING SETS
OIL FIELD EQUIPMENT
DIESEL GENERATOR SETS



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CARDING SETS
SELF-ACTING MULES
RING SPINNING FRAMES

MASCHINENBAU KIEL AKTIENGESELLSCHAFT

KIEL-FRIEDRICHSORT, GERMANY

HOW TO BUY AN

Accounting Machine

1 An accounting machine is no better than the system of which it is a part. The *perfect* system is one designed with your specific needs in mind. Your first step in buying an accounting machine, therefore, is to have a survey made of your accounting operations. This survey should include a study of your policy, methods, problems, prospects and objectives. Only upon the completion of such a study, followed by an analysis of the findings, can recommendations be made for giving your accounting department the benefit of mechanical efficiency.

2 Obviously, such a survey must be conducted by a specialist in the business of serving business – the man from Remington Rand. In recommending a program for mechanizing your accounting department, your Remington Rand representative draws upon the world's richest storehouse of business experience. Experience gleaned from thousands upon thousands of case histories. Experience accumulated over a span of 81 years.

3 The transition from manual to mechanized accounting will be smooth – due in part to the skill of your Remington Rand representative, and in part to the inherent efficiency and flexibility of the *Remington Foremost Accounting Machine*. This single machine does all these jobs: payables, receivables, payroll, general ledgers, cost distribution, sales analysis and inventory. What's more, it switches from one job to another in seconds. Its keyboard is completely electrified, and can be mastered by any competent typist in just half an hour.

4 Whether you number your accounts in the hundreds or in the thousands, Remington Rand mechanization can cut accounting costs 40% to 60% – accounting time up to 70%. Statements, reports and statistics – all neatly prepared, fully itemized and mechanically accurate – can be in your hands immediately after closing the books. Remington Rand mechanized accounting can give you daily figures on sales, costs and overhead as an automatic by-product of normal posting!

Give your business the benefit of mechanized accounting – send for the man from Remington Rand today!

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Prestressed Wall Aids Garage to Resist 'Quakes

Digested from Engineering News-Record, Mar 31, p39—Key element in resisting seismic forces in a nine-story reinforced-concrete garage in San Francisco is a prestressed-concrete shear wall near one corner. This solution to the earthquake problem was arrived at because:

1. The building is of flat-slab construction, with slabs and columns unable to carry the lateral forces without extra reinforcing and possibly serious lateral deflections.

2. Exterior walls are present at one end and one side only; so the 275 x 137-ft. rectangular building would be subjected to enormous torsional moments by seismic forces and would be unstable if additional resisting elements were not provided.

3. A shear wall could be built to take the lateral forces and yet not subtract from the space available for car stalls.

The concrete floors will transmit seismic shears and moments to the shear wall. Columns will offer little lateral resistance. Under seismic loading, the shear wall will act as a 100-ft. vertical cantilever. It is I-shape in section, 36 ft. 9 in. long, with 6 x 6-ft. flanges.

In Next Month's Issue . . .

. . . look for another industry report covering the fast-growing chemical group called silicones. They are versatile materials. They make better jet engines for airplanes and better steam irons for housewives. They resist heat and cold, make fabric water resistant, help sick cows to burp. The list is almost unlimited.

In the U.S. the industry is still expanding. Elsewhere in the world, new plants for silicone production are coming into being. Research in new applications is underway. Next month, a feature article will analyze the silicone industry in terms of its international importance.

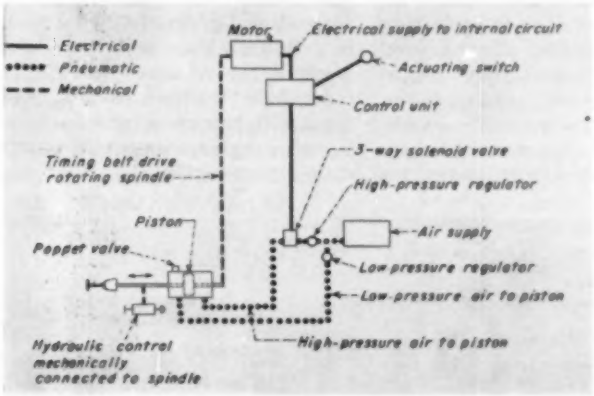
NEW IDEAS TELL HOW TO . . .

. . . determine oil change interval

Digested from National Petroleum News, Apr, p111—A fast and accurate motor-oil spot test to help fleet and industrial lubricant users has been developed by Shell Oil Co.

In the spot test, the analyst uses (1) two drops of crankcase motor oil, (2) filter paper, (3) an indicator fluid. The fluid makes the test different from other spot tests.

The analyst puts two drops of oil on two pieces of paper. As the oil spreads, one pattern is read for contamination and dispersancy; the other, with fluid added, is checked for acidity or alkalinity. Good dispersancy will show if the pattern seems to fade into the white of the filter paper. Alkaline oil will have a blue or green halo around the pattern; acid oil will show red, yellow, or orange.



. . . drill automatically

Digested from Product Engineering, Apr, p146—Automatic drill unit has air-powered traverse with pneumatic and electrical controls for drilling, tapping, reaming. A ½-hp. electric motor drives cutting tool through timing belt. High-pressure air drives tool forward, while low-pressure air cushions forward stroke and retracts piston.

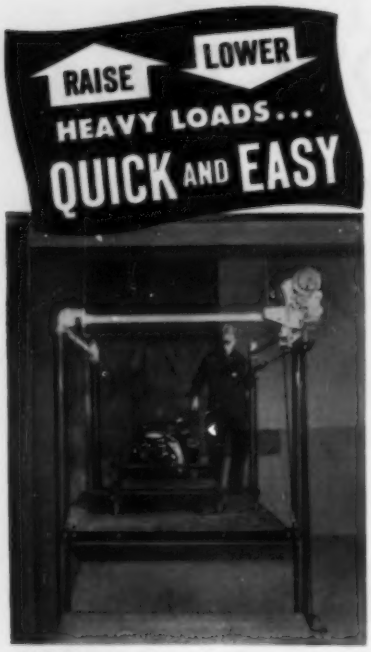
Drill unit, made by Dumore Co. (Racine, Wis.), can automatically activate transfer equipment and indexing fixtures. A repeat-cycle timer opens and closes solenoid-valve circuit repeatedly to aid in chip clearance in deep-hole drilling.

. . . anchor pipe piles

Digested from Construction Methods & Equipment, Apr, p55—An air-powered rotary drill anchors pipe piles into sharply dipped bedrock along Philadelphia's Schuylkill River. In less than 45 min. it drills a 2-ft. socket into the rock at the base of the pile. Both the socket and the pile are then filled with concrete, anchoring the pile to the rock.

The rotary drill operates in 76-ft. leads hung from the boom of a crane. Two 20-hp. air motors power it. One operates the hoist that raises and lowers the drill. The other rotates the drill.

When the base of the leads is clamped to the top of a pile, the hoist lowers the 4-in. hollow drill rod into the pile until the bit makes contact. The bit then is rotated at about 80 rpm. as air blows through it, forcing dirt and chips up and out of the pile.



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Please send me illustrated data booklet on Globe "Electro-Loaders."

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Worker Reactions: How to Handle Them

Digested from Textile World, Mar, p83—People react to their supervisor in different ways. How you should handle the situation depends on the reaction. Here are a few common reactions with hints for handling them:

• **The person is nervous.** Put him at ease. Talk about the things he knows best. Try to get him to talk. Emphasize the constructive purposes of talking to him about his work.

• **He becomes angry** even with a tactful approach. Let him talk himself out. Don't argue. When he calms down, try to assure him that no permanent mark against him has been made. Next time you see him, make a point of being cordial.

• **He indicates,** after being praised for a good performance, that he expects an immediate raise or promotion. If too many men insist on tangible rewards, examine yourself and your discussions with them. Perhaps you have been stressing advancement and promotion too much.

• **He disagrees** with your conclusions without being emotional. It may take several conferences to get him to accept your position. No one ever agrees completely with the people he works with. And your facts might be distorted.

Twist Drill Breaks Chips

Digested from Machinist, Apr 1, p584—A milled rib extending the full length of the flutes effectively acts as a chipbreaker on a new drill made by Firth Brown Tools Ltd. (England).

Cutting takes place along the full length of the cutting edges, with the chips sliding down the face of the flute toward the chipbreaker rib. The chips are curled tightly by the rib and, at the same time, given a sheering action by the inclination of cutting edges to the rib. The combined actions break the chips.

Advantages include more easily handled chips, faster drilling, more rigid drill than with the conventionally ground twist drill. In drilling a 25-in.-deep hole in a turret lathe, the Chipbreaker drill reduced drilling time by 22%; only three withdrawals were necessary to clear chips, compared to 22 with a standard drill.

Mobilvan Speeds Freight Handling

Digested from Factory Management & Maintenance, Mar, p113—You can load these Mobilvans at your shipping dock, use them for temporary storage, then transfer them to rail cars or highway trucks as needed. A heavy-duty fork-lift truck easily handles them. Clark Equipment Co. (Battle Creek, Mich.) makes the new units. Each steel Mobilvan has a capacity of 20,000 lb.—weighs 3,000 lb. when empty. Dimensions are 17 ft. long by 8 ft. wide by 8 ft. high. Three of them can be locked on the bed of a single railroad flat car. Two can be transported on a conventional 35-ft. highway trailer—one on a city flat-bed delivery truck.

Electronic Computers

In electronic processing, the most important part of the program comes before equipment is bought. This means management study

DIGESTED from Harvard Business Review, Mar-Apr, p120—It may be far too soon to predict the ultimate place of electronic computers among office machines or their long-run effects on business organizations. But it is possible, at this point, to make an objective appraisal of potentialities for management men who are just now beginning to investigate the field.

Computers are often classified as either special- or general-purpose, the most significant difference being their degree of flexibility.

Special-purpose equipment is built to perform comparatively few fixed groups or sequences of operations. Such a computer is programmed during its construction (that is, it is instructed to do certain jobs). This being the case, the company operator can select from the sequences available the one he wants performed and then merely push a button or turn a switch to start the computer.

General-purpose computers, in contrast, are completely flexible in that they can perform any desired sequence of operations within the range of their built-in capacity. This means that the user must develop the instructions (programming) for each data-processing.

The instructions are coded and fed to the machine on tape. They are then stored internally until required. Data to be processed are fed in on another tape in accordance with instructions within the computer. This, however, is a skilled and costly job since each step must be anticipated and each exception provided for.

Here are six suggestions to assist company executives who will be looking into the possibilities of electronic data processing.

• It will probably take more time than you think before you can point to tangible savings resulting from electronic data processing. In the case of general-purpose computers, programming runs high. In the case of special-purpose computers, a long period will be required before you can decide exactly what you want the computer to do. Then it will probably take 1 or 2 years before a computer can be built to your specifications.

• Do not despair over the amount of time and cost involved. All preparation may well lead to considerable savings covering much more than just the cost of the studies.

• Have your own personnel do as much of the survey work as possible since this is the only way to gain experience. Computer manufacturers can help you. But your own men will probably be of more use in your whole program.

• If you have a manual data-processing system, it is not necessary to mechanize with punched cards prior to utilization of large general-purpose equipment.

• While special-purpose computers have generally worked out satisfactorily, problems have arisen in a few cases. The major problem has been the result of inadequate planning on the part of purchasers. This has meant extensive and costly revisions in equipment.

• Do not be carried away by all the extravagant claims that have been made about what computers can do. Says one expert: "Computers are not giant brains; in fact, they are quite stupid. . . Electronic computers can't do anything that you don't tell them to do."

All of this adds up to the fact that a company cannot sit back and judge whether or not electronic data processing will be beneficial to it on the basis of experience of other companies.

It is only by the painful process of investigating the logics of computers and by arduous planning and working through of applications that sound decisions can be made on electronic data processing for a particular company. As this all requires much time, it is not too soon to begin an investigation of the field, particularly if your company is large and complex.

Free-Needle Machine

Digested from Product Engineering, Apr, p140—Needle trades have always relied on skilled hand sewers for stitching in making gloves, sportswear, other clothing. A new sewing machine, made by American Machine & Foundry Co. (New York, N. Y.), can now duplicate hand needle stitches. A free double-pointed needle, with its eye in the center, is pushed by an upper needle bar through the cloth and released as a lower needle bar grasps the needle and pulls it on through. In the same way, the needle passes up and down like a hand needle.

Automotive Industry Plans for the Future

Digested from American Automobile, April, p54—Gas turbines for passenger cars and trucks will come sooner than had been thought. No one is willing to make a guess as to exactly when they will be available, but the signs seem to indicate that it will be within 10 years; possibly much less time will be needed.

Meanwhile, 10:1 compression ratios seem certain in at least some 1956 engines. This will inevitably lead to 100 octante gasoline unless there are radical changes in engine design in the interim. Hundred-octane fuel is still a few years away, however. Cost is the big deterrent in its manufacture.

Some standardization in vehicle construction may yet come as a result of efforts by the United Nations. Standard items will be mainly in the safety categories . . . such things as directional signals, windshield wipers, and headlights. There has, however, been some discussion of standard maximum vehicle weights and sizes.

Moving The Earth

New book, Moving the Earth; the Workbook of Excavation, by Herbert L. Nichols Jr., covers the whole field of earthmoving. It is divided into two sections.

The first section, The Work, includes chapters on clearing, rough surveying, soil, ditching and drainage, ponds, roads, blasting and tunneling, and financial management. The approach to each operation is clear, practical, and thorough enough to serve as a complete working guide.

The second section, The Machine, is a detailed discussion of practically every type of earthmoving equipment, covering instruction, operation, and job application.

Moving the Earth is well illustrated and contains 1,280 pages and a glossary of 1,200 terms. It is available from the publisher, North Castle Books, 212 Bedford Road, Greenwich, Conn. Cost is $15.00.

Colored Panels for Bank

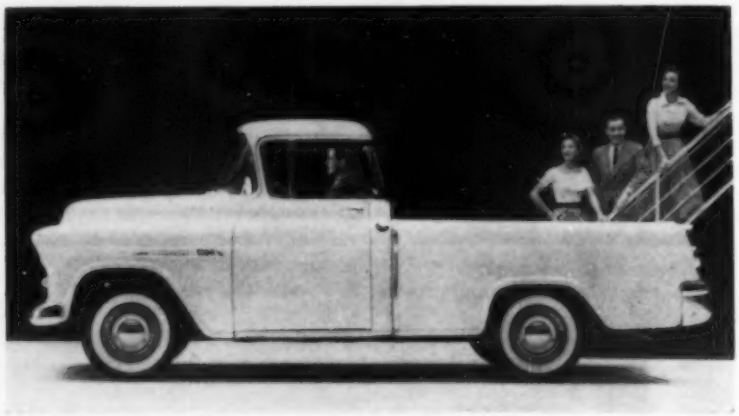
Digested from Engineering News-Record, Apr 14, p25—The First Security Bank Building (Salt Lake City, Utah) is a colorful example of the use of porcelain-enameled steel panels. The 12-story building is framed in rust-colored panels with portions of the facade in off-white and gray. Squares, stamped into the metal before the coating was applied, create a "waffle" effect and help add strength to the panel.

Three of the 4 x 4-ft. spandrel panels were bolted to a steel grid to form a 4 x 12-ft. assembled unit one-story high. The units were fastened to the main structural steel with angle clips.

To insulate the building, a paper-backed wire mesh was fastened to the inside of the grids, covering the panel back, and sprayed with lightweight plaster. Seaporcel Metals, Inc. (Long Island City, N. Y.) fabricated and erected the panels.

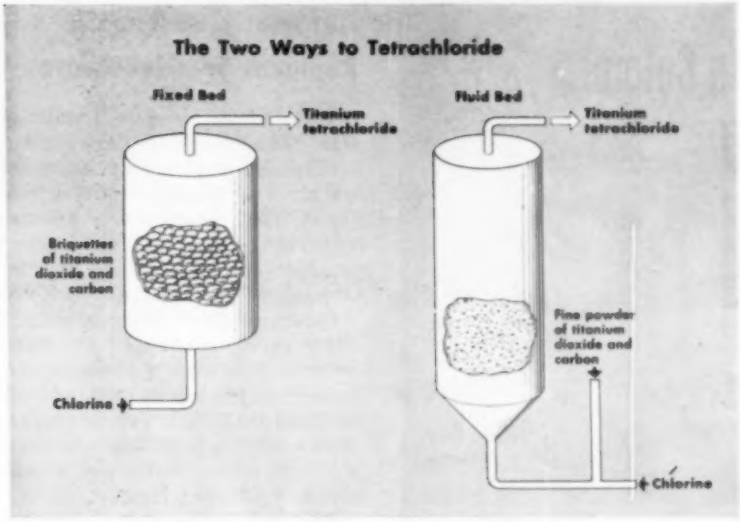
New Trucks for 1955

DODGE truck line this year offers engines with 12 different horsepower ratings, greatly increased power, new styling, and wrap-around windshields. Exceptional glass area can be seen. Cab roof is supported by four narrow pillars.



CHEVROLET'S truck line for 1955 includes 75 models on 15 wheelbases. Buyers also have a choice of five 6-cylinder engines and a new V-8 with 145 hp. The "Cameo Carrier" pickup, shown above, has reinforced glass-fiber side panels.

GENERAL MOTORS CORP. model 500 tractor has a shorter cab than 1954 models, but is said to sacrifice nothing in driver comfort. GMC has 74 new truck models in 1955 with V-8 engines.—American Automobile, May.



Fluid-Bed Processing . . .

. . . is Du Pont's secret method for making titanium tettrachloride. It avoids many of the special problems arising in the standard process

DIGESTED from Chemical Week, Mar 19, p84—One of Du Pont's proudest achievements has been its method of chlorinating titanium ore to get titanium tetrachloride—key starting point for titanium and titanium oxide. And Du Pont has been as reluctant to talk about the method as it has been proud of developing it.

Two patents just issued have revealed essential details of the method and have identified it as fluid-bed chlorination.

The normal procedure is to chlorinate briquettes or pellets of titania and a carbonaceous reducing agent. One disadvantage is that binders for the pellets contain hydrogen, which would cause chlorine loss by reacting to form hydrogen chloride. So the pellets must be calcined to drive off hydrogen. Other disadvantages: large capital investment, special charging equipment, localized overheating of solids, clinker formation, minimum size of briquettes.

The fluid-bed process bypasses many of these problems. The reactor, in a typical run as cited in the patents, was heated to 800° to 850° C. by products of combustion from an oil burner. A finely powdered charge of 100 parts of ilmenite ore to 15 parts of hard burned coal was fed from a hopper, preheated by the gaseous products, and sent to a cyclone. From there it fell through a pipe leading to the line feeding hot gases and chlorine to the reactor.

A 3-ft.-deep bed formed in the reactor. At 800° C., gases were shut off and chlorine fed at 1,144 lb. per hr. with ore-coke feed at 772 lb. per hr.

Coarse ash, after 15 hr. of chlorination, had accumulated so that the material in the reactor analyzed between 15 and 20% titanium dioxide. Periodic ash removal was then started.

Ash removed from the reactor was sent through a cyclone. Total ash formed was small—less than 10% by weight of feed. It was removed intermittently at a rate of 65 lb. per hr.

Products from the reaction are titanium tetrachloride and ferric chloride. They are recovered by condensation in spray towers and separation in a settling tank to remove insolubles and sludge.

The Du Pont method is also adaptable to processing of titanium rich slag (as produced in Canada). Some modification of the process is necessary to remove alkaline earths and alkali metal compounds in the slag.

Exhaust Helps Brake Trucks on Long Grades

Digested from Fleet Owner, Mar, p143—If you have trucks operating over long grades, you can now acquire a new braking system that utilizes engine compression. Developed by the Power Brake and Equipment Co. (Portland, Oregon), the system takes the air pressure (about 50 lb. per sq. in.) that has been built up in the exhaust system of an idling truck engine on downhill runs and adapts this pressure to provide extra resistance to engine turnover.

Operation is controlled by the driver with a hand valve on the steering post. A gage shows manifold pressure. The amount of brake pressure is controlled by hand and is released immediately by the foot throttle. It is adaptable to both gasoline and Diesel equipment.

The equipment consists of a butterfly valve installed between the exhaust manifold and the muffler. This is hooked up with a linkage to make it possible to keep the valve closed when the throttle is closed.

Expendable Carbide Bits

Digested from American Machinist, Feb 28, p130—New carbide-tool holder clamps a thin wafer of expendable carbide. The wafer can be repositioned to use several cutting edges but is not resharpened. When all cutting edges are dulled, the bit is discarded.

Experience so far indicates that the idea saves money in comparison with the usual practice of regrinding, especially for larger bits.

One example is turning the OD of a forged steel ring at a speed of 350 ft. per min., feed of 0.015 to 0.018 in. per rev., and depth of cut of $\frac{1}{8}$ to $\frac{1}{4}$ in. Total cost of 20,000 pieces dropped from $273 with the former holder to $50 with the "expendable" tool holder.

Another advantage of the new tool is that job shops can adapt carbide more economically. Short runs and the wide variety of operations demand a big tool inventory. Using the expendable wafers reduces the size of inventory needed.

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Six of these plants, like the one illustrated above at Buga, will have a storage capacity of approximately 4000 metric tons each. The other two will store approximately 1700 metric tons each. Up to 3,000 bu. per hour of threshed grain, shelled corn and rough rice can be received, fumigated, weighed, cleaned, dried and bagged at each installation.

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Automatic Packaging Replaces Wooden Crate

Digested from Ceramic Industry, Mar, p62—Automatic packaging equipment now crates washing machines at Maytag Co. (Newton, Iowa) in cardboard cartons. The cartons replace wire-bound, wooden crates used so widely throughout the industry.

Cartons consist of a corrugated outer card, an inner liner that rests on the washer's wooden crate bottom, and a top support pad of cardboard. Middle boards on the crate bottom and the top pad supply firm surfaces against which carton flaps are glued.

The crating machine, made by A-B-C Packaging Machine Corp., is integrated into the conveyor system at the end of assembly. At the entrance to the machine, the carton, with all flaps open, is slipped over the washer by hand.

Two flaps at each end are folded by guides at the first station in the machine. Glue is applied automaticably to top and bottom as the machine starts to close the other flaps. The carton, with flaps completely closed, then enters another section of the machine where rollers exert pressure on top and bottom until the glue dries.

Sugar-Cane Chemicals

Digested from Chemical Week, Mar 26, p55—New chemicals are coming from sugar cane. That's the result of by-product research by the Hawaiian Sugar Planters Association's experimental station.

The association, in conjunction with Crown-Williamette Paper Co. of Camas, Wash., has developed a process to convert bagasse to paper pulp. Cost data on the economic feasibility of the method will soon be released.

Other successes: cattle and poultry feed from waste molasses and a concrete aggregate utilizing bagasse in place of sand and gravel. The aggregate may yield a concrete-like material that can be sawed and worked like wood.

Technically successful but not yet economically so are by-product furfural, waxes, alcohol, acids, antibiotics.

U.S. Army Testing New Convertiplane

Digested from Aviation Week, Feb 21, p17—Another possible solution in the search for a suitable "convertiplane" (a cross between a helicopter and a standard forward-flight plane) has been put forward by Bell Aircraft Corp.

The newly announced Bell XV-3 is under consideration by the Army for use as a tactical craft for observation, reconnaissance, evacuation, rescue, and liaison.

Biggest drawback of conventional helicopters is limited speed and range. It is hoped that the convertiplane will be able to combine the best features of the helicopter and standard airplane. Speed of the new Bell XV-3 ranges from hovering to an estimated 175 mi. per hr.

Wing-tip rotors of the XV-3 provide both lift and propulsion. When the convertiplane is off the ground, rotors are tilted forward and lift is converted into thrust for forward flight. Conventional airplane wings are small but have sufficient area to sustain the weight of the plane in forward flight.

Ceramic Cutting Tools

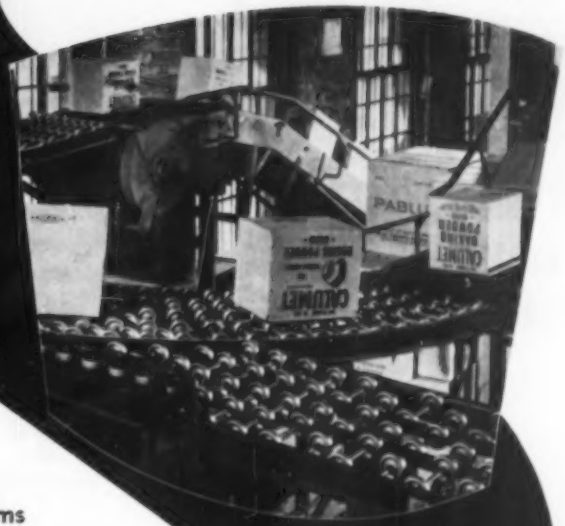
Digested from American Machinist, Feb 28, p153—Watertown Arsenal (Mass.) has been cutting type 4140 steel (chromium-molybdenum) at a speed of 1,200 ft. per min., feed of 0.008 in. per rev., and depth of cut of 0.125 in. with ceramic cutting tools.

The ceramic bit, of high-purity aluminum oxide, is held in a special tool holder that provides even distribution of clamping forces and minimum overhang.

Angles found to work the best are 10° side cutting-edge angle, 5° end cutting-edge angle, 0° back rake, 10° side and end clearance angles. A narrow negative 7° land on the side rake, followed by a ±10° angle, supports the cutting edge and protects it from curling chips.

Diamond wheels of 150 to 350 grit sharpened the ceramic bits with a lustrous finish. The bottom of each bit must be ground flat to avoid cracking when it is clamped.

There's a profit saving new idea for you in this picture . . .



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Irradiated Polyethylene Finds New Applications

Digested from Modern Plastics, Mar, p102—Irrathene, irradiated polyethylene, is being produced in large pilot-plant quantities for experimental purposes by General Electric Co. Two grades are being produced, 101 and 201.

Irrathene 101 is like conventional polyethylene, but it does not melt at temperatures as high as 350° F. Irrathene 201 contains an oxidation inhibitor that permits its continuous use at 257° F. Both find use as motor insulation.

Agilene-HT is made by American Agile Corp. Its heat resistance allows boiling-water sterilization, yet it retains the features of ordinary polyethylene. Laboratory and hospital ware fall into this category. Tubing and pipe have complete freedom from stress cracking. Thin-walled irradiated tubing lines steel pipe. The complete pipe can be safely steam-cleaned. Corrosion-resistant gaskets for continuous operation at 220° F. are possible with irradiated polyethylene.

Irradiated sheet can be welded and can be deep-drawn by the vacuum process. Little temperature control is required. Ordinary polyethylene presents problems in vacuum forming because of its narrow melting range.

Tool Tells Hole Secrets

Digested from Oil & Gas Journal, Mar 28, p115—It has long been a mystery on what actually goes on down in the bottom of a drilling well. A new instrument now tells, by recording several variable at one time during drilling.

A nine-channel recording oscillograph, made by Borg-Warner Corp., measures and records stresses, pressures, temperatures, accelerations, impacts, vibrations, displacements, velocities, and time. It allows correlation of any one variable as a function of the others.

The oscillograph will be used in two ways. One will deal with measurements to develop better drills and better drilling methods. The second, possibly the more important, will be as a logging instrument.

Joint Sealing Material Stands Rugged Service

Digested from Product Engineering, Mar, p129—Polysulfide liquid polymer sealers are ideally suited for rugged service applications. They resist attack by oxidation, aircraft fuels, most organic solvents, oils, and water and have superior flexibility at low temperatures.

Uses are growing constantly. In the aircraft industry, they seal pressure cabins, access doors, integral fuel and oil tanks and act as dielectric sealers for electrical connections. In the marine field, they seal wood deck and hull seams. Other uses: sealing washing-machine agitator parts; concrete and metal expansion joints; and caulking.

Polysulfide polymers are prepared by reacting organic dihalides, such as ethylene dichloride, with sodium polysulfide. Pigments and other compounding ingredients are then added as necessary.

An accelerator, usually based on lead dioxide, is supplied with the sealer. The user mixes the accelerator into the base sealer and applies the mixture in the liquid state by an air-driven caulking gun. The sealer then cures to a solid, rubber-like material. The most widely used combination has a working life of 2 to 4 hr. and a curing time of 24 to 48 hr. Both can be varied, as required by the job, by selection of the accelerator compound.

Automatic Balancing

Digested from Machinist, Feb 18, p283—Mass centering and dynamic balacing of crank shafts have now been made automatic at Ford Motor Co., Ltd. (England). The equipment was supplied by Carl Schenck of Darmstadt, Germany.

The mass centering machine dynamically balances and centers all rough crankshaft castings. The shaft, supported in a cradle by four adjusting pins, is brought into balance by movement of the pins to counteract out-of-balance horizontal and vertical components. As soon as the shaft is in balance, a drilling head at each end feeds in automatically to drill the center holes.

At present, there are only three such machines in England, all used on crankshafts. The principle, however, can be applied to other parts, such as flywheels and clutches.

Out-of-balance produced during machining of the shaft is corrected in a final balancing machine. The shaft is measured for balance, then drilled by two drills to depths predetermined by the balance measurement. Two stations on this machine make the operation continuous.

Ratio Delay Measures Maintenance Efficiency

Digested from Chemical Week, Mar 5, p46—Canadian Industries Ltd. is measuring maintenance work with a statistical system called ratio delay. Sometimes referred to as work sampling, ratio delay is statistical quality control applied to human activity.

Ratio delay establishes the ratio of specific delays to over-all time. It enables supervisors to estimate work pace accurately, plant managers to check maintenance productivity.

The system, based on random sampling, avoids many of the disadvantages of other systems of maintenance-work measurement (McG-H Digest, Mar, p15). It is simple and inexpensive to administer.

The first step in a typical study is to make a rough preliminary study, which might show that the men are working 80% of the time. A nomograph would then show that 400 observations are necessary for accuracy.

The observer makes these observations, rating the men according to some standard (as a point-hour system with 60 as the average daily performance). Dividing point-hours by number of observations gives the performance rating for the day's operation.

Results are plotted daily and, if desired, monthly and yearly to show long-term trends. Or they can be further refined for charts on performance by shifts or by areas to spot breakdowns and reveal potential centers for improvement.

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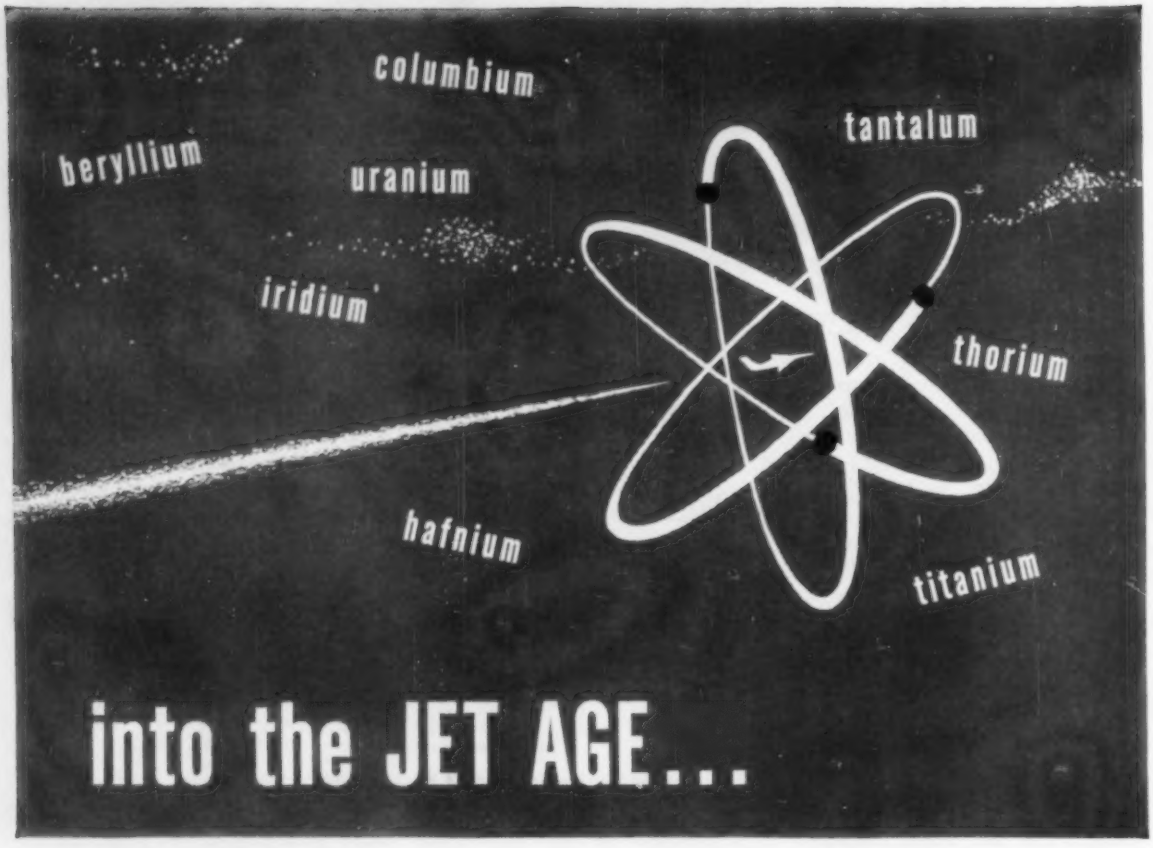

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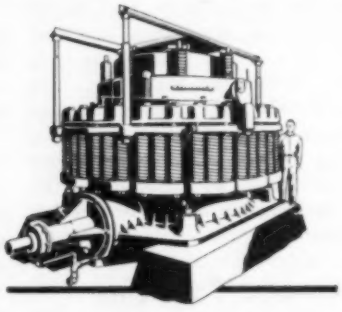

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- So-called "wonder metal," titanium, faces up to reality.
- Problems: high cost, limited supply, uncertain quality.
- But, despite problems, a look ahead shows that the . . .

Titanium Future Looks Bright

DIGESTED from Engineering & Mining Journal, Apr, p72—There's still trouble in titanium. Despite the name "wonder metal" and its unusual properties, it has a long way to go before it becomes as common a material as, say, aluminum. Right now it is high priced, the supply is still limited; quality is still variable and fabrication "know how" has yet to be fully developed. But what of the future?

An analysis of the situation by expert H. H. Kellogg, Columbia University, reveals:

1. That present problems and doubts concerning titanium result from the infant nature of the industry, rather than from inherent shortcomings of titanium itself.

2. That, even though improved processes might well be developed, the Kroll process has been seriously underrated by its critics.

3. That even without major improvements in technology it should be possible to produce titanium mill products for about $2 per lb. when the industry has matured. At that time the industry will have grown to a peace time capacity of several hundred thousand tons per year in the U. S. alone.

The titanium metal industry is barely 6 years old. In that period, the price of sponge titanium has dropped somewhat as production increased. As of April 1, sponge cost $3.95 per lb. Eventually Kellogg feels Kroll process sponge will cost $1.15 and new processes under development or yet to come will turn out sponge at $0.80 per lb.

Why the Price Is High

Reasons for today's high prices other than those inherent in the manufacture of titanium include:

- **Rapid amortization** of plant costs is necessary because of the probability of early obsolescence of present methods.
- **Research and development expenses** are excessive because of constant pressure for improved product quality and the need to investigate new or modified production processes.
- **Off-grade product** may represent a sizeable fraction of total plant output and it is a total loss. No refining method for offgrade products exists, as yet.
- **Volume of production** is small and uncertain, with resultant high costs. Common procedure today is to have a small titanium melt shop near a fabrication plant for stainless steel, and to forge, condition, and roll titanium only when it can be fitted into the steel-fabrication schedule. Perhaps the largest single reduction in costs, and improvement in quality, may be expected when the volume of titanium consumption justifies integrated melting and fabricating facilities, specifically designed for titanium.
- **Retreatment of titanium scrap** on a large scale has not been possible. Thus, the fabricator is unable to reuse at least part of his scrap. But scrap refining processes are being developed. When full scrap utilization is achieved, considerable reduction in the price of titanium mill products should result.

How Much Time for Growth?

Kellogg feels the industry's growth period will last 10 to 15 years. The mature industry will then look like this:

Price of sponge, $1.15 per lb.

Price of ingot, $1.30 per lb.

Average price of mill products, $2.09 per lb.

Plant size of the order of 30,000 tons annual capacity.

Annual U. S. production, 200,000 tons or more.

Abundance of titanium ores throughout most of the world is one of the most significant signposts for the future importance of titanium. Unlike copper, nickel, and cobalt, scarcity of ores is not likely to limit the importance of titanium.

Of the three types of ore available—rutile, ilmenite and ferruginous ilmenite—rutile is the logical ore on which to base the production of titanium metal. It permits the simplest technology in titanium refining. But, for the future, rutile's comparatively high cost and its relative scarcity will cause a shift toward ilmenite to take place.

Production Stays Costly

From the beginning of sponge production to the final fabrication of a consumer product, the peculiar properties of titanium demand radically new methods of metallurgical processing. Titanium will always be produced and melted in a vacuum or inert-gas atmospheres. Preparation of the pure metal directly from the oxide will remain a next-to-impossible task.

Production metallurgy of titanium metal will always be of a special nature. It will always be necessary to take more precautions and to use more expensive processing techniques than are necessary for other metals. As a consequence, it is safe to assume that titanium will always be more expensive than the more common metals—aluminum, iron, and magnesium.

Cost of a moderate-size Kroll plant is about $2,000 to $2,500 per annual ton of capacity. Because the future plant is assumed by Kellogg to use essentially the same process, no major reduction in the cost can be assumed. However, increased size and substitution of leaching for vacuum distillation commonly used now should both effect some economy. Sponge reduction and purification by leaching will cost about $1,600 per annual ton of capacity.

Melting and fabrication of titanium will undoubtedly be integrated in one plant. In fact, it is likely that the entire spectrum of the titanium industry, from mining to fabrication, will be integrated by several large companies.

TECHNICAL IDEAS . . .

Atomic Scale Weighs Sugar Cane

Digested from Chemical Week, Mar 12, p52—Radioactivity has been put to a new use by Hawaiian Sugar Planters Association's experiment station in measuring the weight of a loose material. The sugar industry has been plagued for years with the problem of weighing wet cane during continuous processing. In the new setup, bagasse falls between radioactive cobalt and a geiger counter. Absorbed radioactivity is proportional to the weight, which can then be determined to an accuracy within 2%. Studies are now underway to apply the idea to weighing of sugar.

Ceramic-coated Glass—Pittsburgh Corning Corp. (Pittsburgh, Pa.) has developed a unique cellular-glass insulating material having a ¼-in.-thick ceramic finish. Called Duraface Foamglas, it allows erection of insulated, surface-finished wall in one operation.—Ceramic Ind, Apr, p50

Iodized Salt Harmless—Use of iodized salt in processing fruits and vegetables that contain considerable amounts of salt has no detrimental effect on quality. This conclusion results from a long series of experiments carried out on various products.—Food Engr, Apr, p180

Tubeless Truck Tires—Tubeless truck tires are now available. The manufacturer, Goodyear Tire & Rubber Co., claims these advantages: a saving in wheel weight, simplified tire mounting, fewer road delays because of flats and blowouts. — National Petroleum News, Apr, p153

Automatic Encyclopedia—Dr. Vannevar Bush told a recent meeting of the American Society of Mechanical Engineers that the mounting volume of human knowledge should be coded and made available "in prompt, accurate, effective fashion, and at a distance if this is desired." Bush pointed out that equipment is at hand to do the job in the form of scanners, photographic methods, and computers. — Control Eng, Apr, p13

Vinyl Chloride Lining — Large tanks and other equipment can be lined with unplasticized polyvinyl chloride developed by Kaykor Industries, Inc. (Yardville, N. J.). It is a special continuous laminate of unplasticized PVC on one face and plasticized PVC on the other. Corrosion resistance of unplasticized material is combined with flexibility and ability of plasticized PVC to be bonded to steel, concrete, or wood.—Mod Plastics, Apr, p252

Cuts Maintenance Costs — Ethyl Corp. at Baton Rouge, La., plant cut manpower needed by 12% by: (1) centralizing maintenance facilities, (2) streamlining delivery of supplies from centralized location to maintenance men, (3) setting up daily scheduling and checking on job methods.—Pet Proc, Apr, p530

High-strength Bolts—Denver's 23-story Mile High Center building points up some of the advantages of high-strength bolts in joining structural-steel members. They cut erection time to 82 days. They are easier to install than rivets. There is no fire hazard. Less-skilled labor is required, and bolting is quieter than riveting.—Const Meth & Equip, Apr, p50

Paint-wear Studies — Michigan State Highway Dept. makes wear studies of traffic paint with a beta gage. It allows simple and fast measurement of wear caused by an abrasion wheel without the usual need of running the test until the backing material shows through.—Nucleonics, Apr, p10

Cuts Cleaning Time—Cleaning insulators with compressed air and a finely ground powder called calcite saves about 85% of the time formerly required on some jobs. Results have been so satisfactory that many interruptions from flashovers have been eliminated.—Elec World, Apr 4, p87

Arctic Rubber House—Air contained in 24 arched rubber tubes provides sufficient structural strength to permit a rubber shelter to withstand 80-mph. winds and a 24-ton snow load. The shelter weighs 7,500 lb.—Aviation Wk, Apr 18, p102

Stronger Press Fits—Use of molybdenum disulfide lubricants in press fits reduces scoring, galling, and distortion. It eases assembly, thereby allowing larger interferences between parts and strengthening the joint.—Prod Eng, Apr, p209

Flight Without Wings

Digested from Business Week, Apr 16, p30—Probably the simplest-to-operate aircraft yet produced is the so-called "flying platform" made by Hiller Helicopters. Lift is provided by two counter-rotating fans inside the case. Blades draw air through ducts in the top of the platform and force it out through the bottom. Pilot controls direction by shifting his weight slightly in the direction he wishes to go. Fans are powered by two engines that together develop 100 hp.

Quieter Machine Tool—Polish single-spindle automatic, shown at Leipsig Fair, has steel change gears mated with resin-impregnated silk gears and a powder-filled barstock carrier (to wipe stock by felt pads before entering the chuck). Both features reduce noise.—Mach, Apr 1, p603

Polka-dot Paint—Multicolor-in-one coat, or polka-dot, paints are joined by a new one, an acrylic developed by Magna Coatings & Chemical Corp. to challenge the nitrocellulose multicolor lacquers. Suggested applications: on canvas, metals, and masonry.—Chem Wk, Apr 2, p78

Prevents Corrosion—Volatile film-forming amines, injected into feedwater for low-pressure boilers, vaporize and form protective film on metal surfaces. A leader is Hagafilm, made by Hagan Corp. (Pittsburgh, Pa.). Use reduces corrosion rate by 90%.—Chem Eng, Apr, p140

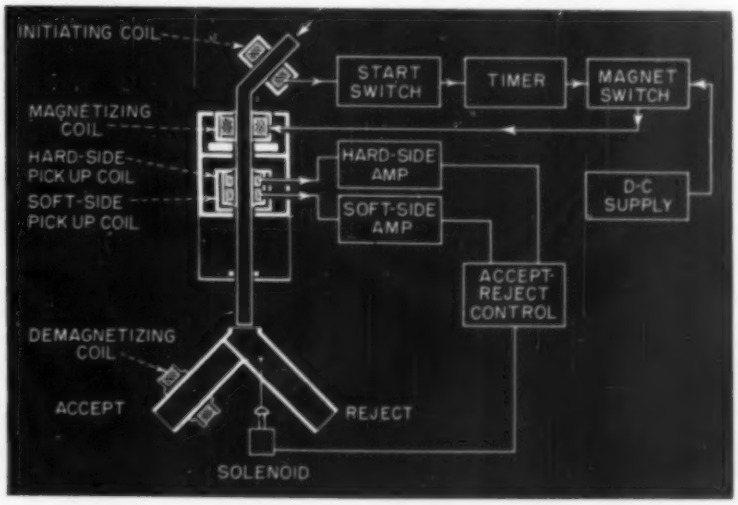
Rigid PVC Moldings — Stokes Molded Products Div. of Electric Storage Battery Co. (Trenton, N. J.) has found a way to mold almost-pure rigid polyvinyl chloride economically. New moldings will cut costs for industries that use corrosive and caustic chemicals and organic solvents. They are half as heavy as stainless steel.—Factory, Apr, p109

Plastic-coated Paper — W. F. Brown, Florida University, reports use of polyamide resin in coated papers to resist peanut-oil penetration for 1,000 hr. at 73°F. and 50% relative humidity. Methyl cellulose, used as thickening agent, increased water-vapor transmission rate.—Paper Ind, Mar, p1199

Oil Hydraulic Pumps—Largest hydraulic pumps ever built are operating the saddle of the world's biggest tube-reducing machine. Hydraulic method of operation provides: variable stroke range; variable positioning of short stroke within range of the full stroke; means of progressively shortening stroke; and variable speed as a function of stroke length.—Power, Apr, p156

Packages Poultry — Shrinkable polyethylene combines eye appeal and highly effective product protection for frozen poultry. When poultry is placed in a shrinkable polyethylene bag, the residual air withdrawn by a vacuum nozzle and the bag sealed, the film shrinks up tightly around the product upon being dipped in hot water.—Mod Packaging, Mar, p100

Plastic Skin for Hotel—Sprayed-on plastic skin covers new 15-story Carlton Hotel (Tyler, Tex.). Vinyl-plastic covering has a smooth surface and is impervious to mildew, mold, acids, petroleum solvents, and alkalis. Average application cost was 40¢ per sq. ft. Little maintenance will be needed.—Am Business, Mar, p5



Magnetic Hardness Tester Sorts Castings

Digested from American Machinist, Mar 28, p116—Automatic magnetic comparator, developed by General Motors Corp., measures hardness of pearlitic-malleable-iron rocker arms for automobile engines at a rate of 3,000 pieces per hr. It rejects parts above or below preselected hardness levels. Parts are first magnetized, then fall through pickup coils that trigger the accept-reject control. No physical contact is made, as in Brinelling. Accepted parts are demagnetized as they pass into the accept bin.

International Business Briefs

CAIRO—The Egyptian Government may ease currency and import restrictions. The move could well result from the improvement in Egypt's foreign-currency balances during the first two months of this year.

In January and February, foreign currency balances rose E£ 1½-million, bringing total reserves to E£ 274-million. The recent additions have been mostly in dollars and pounds.

LONDON—Britain will permit the purchase of raw materials, particularly green coffee, in the amount of £2½-million from dollar-account Latin American countries.

Thus far there has been no actual allocation of purchases by country, but it is expected that the majority of freed funds will go to the coffee-producing republics.

RANGOON — The Burmese Ministry for Trade and Development will in the future issue import licenses for raw materials and machinery at six-month intervals instead of at any time during the year as has been done in the past.

Licenses for machinery needed for new installations or for expansion of existing plants will, however, be issued as and when necessary.

TEL-AVIV — A $368-million foreign currency budget outlining Israel's import-export program for the 12-month period starting April, 1955, has been announced.

Imports of raw materials for export industries will be increased by 22% to $50-million. Food imports will also be up $2-million. Imports of capital equipment will run approximately $90-million.

Petroleum Field Sees Technical Advances

Digested from Oil & Gas Journal —Both exploration and production share in the new developments:

► **Miniac II,** a $90,000 electronic brain made by Marchant Research, Inc. (Oakland, Cal.), will soon be solving complicated problems for Atlantic Refining Co. Two such problems are: (1) to work out the most efficient rate of production from thin oil columns, (2) to improve formation-fracturing techniques.—Feb 14, p75

► **Exhaust gas** from the drilling-rig engine is serving as the drilling fluid at a Carter Oil Co. well in Arkansas. Substituting the gas for mud boosted drilling speed and increasing bit life by 475%. Its corrosiveness posed a problem that was solved by reduction of water content and use of inhibitors.—Feb 21, p119

► **Air may reduce** corrosion in refining equipment. So Shell Oil Co. has found out at its Wood River, Ill., refinery. Hydrogen sulfide reacts with steel to produce hydrogen, which builds up on interior surfaces and diffuses into the steel. Result is blisters and fissures in the steel. Air admitted into the system combines with the sulfide to form a protective coating of polysulfide on the steel surfaces.—Mar 14, p80

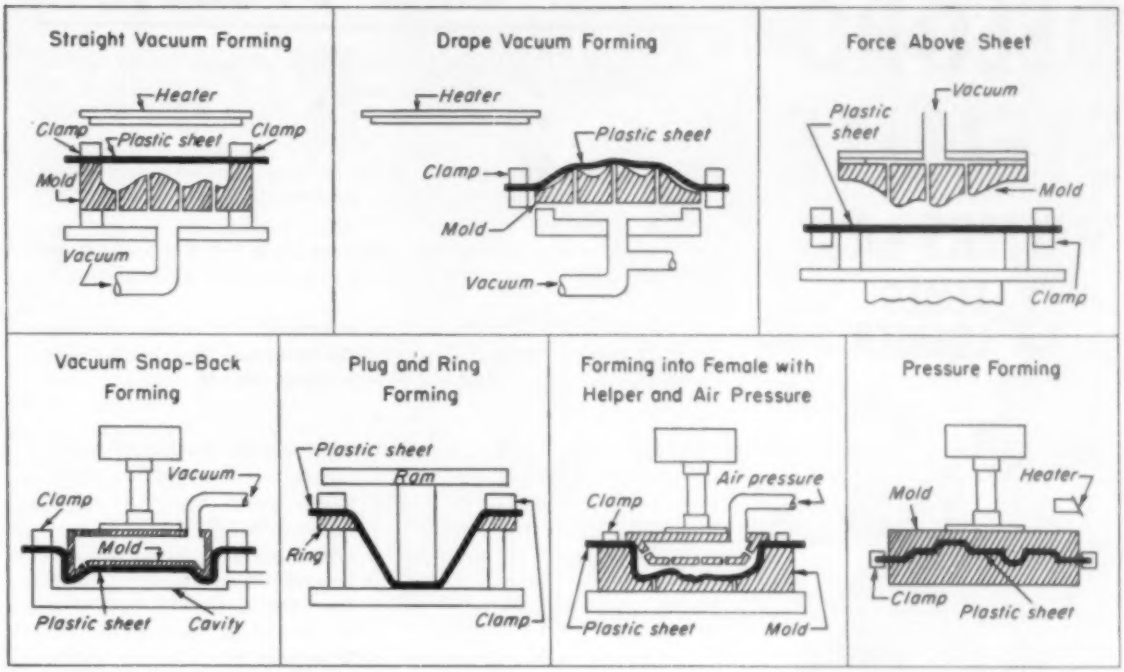
World Motor Census

Digested from American Automobile, May, p33—World use of cars, trucks, and buses has risen to a new record of 87,035,434 countable vehicles. The new figure represents totals as of January 1, 1955.

The annual census reflects a 12% increase over the previous 12-month period, exclusive of vehicles operating in the U.S. and Canada. Total world increase, including the U.S. and Canada, was 6%.

The reason for the faster increase outside the U.S. and Canada can be attributed to production of vehicles. Output in the U.S. during 1954 was 6.6-million units as against 7.3-million in 1953. All other major manufacturing countries had record years in 1954.

The Technique



The Product

SPOON DISPLAY is formed in two halves of silver-metallized butyrate sheet and then cemented together.

IN "SKIN PACKAGING," items are first placed on cards. Sheet is drawn over cards to form protective skin.

CARDED MERCHANDISE has items enclosed in contoured transparent bubbles. Package is neat, attractive.

New Uses for Plastics

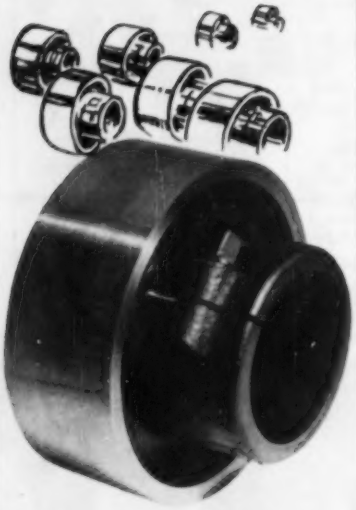
DIGESTED from Modern Plastics, Apr, p87 — Vacuum or pressure forming of thermoplastic sheets is rapidly becoming a major processing technique in the plastics industry. The technique is more adaptable to mass production of thin-wall, broad-area objects than is any other molding process.

Equipment costs are relatively small—$1,000 to $15,000. Tooling costs are proportionately low; set-up time is fast and production rate can be effectively speeded up by multi-cavity molds. Large objects can be formed at low mold costs.

Sheet-forming equipment varies. Standard vacuum-forming machines or combination standard and drape vacuum-forming units are available. Machines with virtually any degree of control from all-manual to completely automatic can be had. Mold materials include plaster, wood, cast phenolic,

CHEESE CONTAINER is formed of polyethylene sheet. Polyethylene-coated cellophane is heat-sealed to top.

DELORO STELLITE SLITTERS LAST 8 TIMES LONGER



In high speed newsprint mills where steel slitters were formerly re-sharpened once a week, Deloro Stellite Paper Slitters now average two months between grinds. In low speed mills the increased life is even greater . . . lasting as long as three years between grinds.

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FINANCIAL DIGEST

EUROPEAN PAYMENTS UNION will be extended 1 year beyond its June 30th expiration. But there will be a provision that the credit and clearing union can be abandoned earlier if major countries decide to lift currency controls.

The big decision will lie with Britain. German Economics Minister Erhard says that the Deutschemark will be freed when sterling is convertible and not before.

Meanwhile negotiations are underway on a new European Fund to replace EPU. Payments Union will transfer $273-million to the fund.

Purpose of the new fund will be to prevent contraction of trade within Europe after convertibility removes the barriers to expansion of British and continental dollar trade.

✦ ✦ ✦

COMMERCIAL PAPER, a traditional source of short-term money in the U.S., is finding a more active market. "Commercial paper" refers to short-term promissory notes issued by corporations for periods that usually range from 4 to 6 months.

But the revival of commercial paper handled by specialized dealers has been overshadowed by the growth of another type of paper . . . short-term notes of the five largest finance companies in the U.S.

Among the chief advantages to the borrower: rates are generally lower than rates for short-term bank loans. Prime paper rates at the moment range around 1¾ to 1⅞%. Prime rate on New York bank loans is 3%.

The rate on finance company paper (which bypasses dealers) is generally lower than on commercial paper. A recent rise in commercial paper rates was followed by a similar rise in finance-company paper rates. And following money market trends, it is probable that both will rise soon again.

✦ ✦ ✦

THE TREND toward a tighter U.S. money market, predicted by the McG-H Digest (May, p34) is highlighted by the Securities and Exchange Commission's tightening of stock brokers' borrowing on "net capital" . . . which consists mostly of securities and commodities futures contracts.

The move was not meant to reflect on the solvency or soundness of brokerage firms. Rather it is a step to supplement the general move toward stabilizing credit.

Other trend pointers: Margin requirements have also started their climb, as forecast in this section, and by late April had been raised to 70%.

Also in late April, the Federal Reserve Board raised its rediscount rate—the rate at which banks can borrow from the FRB—from 1½% to 1¾%.

✦ ✦ ✦

VOLATILE STOCK MARKET in the U.S. is reviving an old trading technique frequently used by speculators who have high paper profits and want to protect them. The technique, known as "selling against the box" works this way:

The investor sells short in the amount of his actual holding. If the stock drops, he can buy sufficient shares to cover his sale at a profit. If, on the other hand, the stock continues to rise, he can deliver his holding against the sale.

Financial Digest, compiled from various sources, analyzes current financial trends and underlying factors.

New Packaging Idea Omits Bag Liners

Digested from Food Engineering, Apr, p63—In an effort to attain higher quality and at the same time to lower costs, Björnekulla Fruit Industries in Sweden has installed a new packaging unit.

Using a special frozen-food package, the equipment eliminates the inside carton-bag. Leakage is prevented by a paper strip sealed under the flaps.

Biggest benefit of this design is the reduction of carton costs through savings in material – while increasing tightness of closure prevents dehydration.

In manufacturing the carton, cuts between the flaps are not extended to the body of the carton. When the packages are set up, flap corners are deliberately torn when unfolded in the machine. The resulting fibrous corners are compressed by high pressure on the flaps during sealing. This assures an excellent bond between cover paper and carton.

Explosion-Proof Lights Give Greater Safety

Digested from Electrical Construction & Maintenance, Mar, p96—In manufacturing operations involving highly volatile chemicals, explosion-proof lighting can be important. To insure greatest safety, Armour and Co., in its new pharmaceutical center, has installed fluorescent lamps encased in heat-resisting glass tubes mounted in cast luminaires.

The fluorescent luminaires consist of two or more lamps, protected by glass tubes that are sealed at the ends into aluminum socket housings. Threaded to the housing are removable covers with flame-tight joints. A flammable mixture can enter the cover joints and explode harmlessly inside the luminaires.

Two factors provide this protection. After an explosion has occurred inside the housing, the threaded joints allow the mixture to escape only as cooled exhaust gasses. The cast housings are strong enough to contain any number of repeated explosions.

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Vaccine for Polio

Scientists and technicians are working on means of reducing production bottlenecks

DIGESTED from Business Week, Apr 16, p136—The Salk vaccine for the control of poliomyelitis has proven in tests across the U. S. to be 80 to 90% effective. The problem now will be volume production of the vaccine.

It is not that production is particularly difficult. It is, in fact, a relatively straightforward process. It does, however, require time and materials. Basically, the process is this:

It starts with monkeys—lots of them. One estimate puts requirements at 100,000 per year. They are important for three reasons: (1) viruses reproduce only in living tissue; (2) poliomyelitis virus thrives best in the tissue of primates; (3) the monkey is the least expensive and most practical primate to handle on a large scale.

Kidneys of healthy monkeys are removed, minced, and mixed with a culture medium containing amino acids, dextrose, vitamins, and minerals . . . a total of 50 ingredients.

Cultures are rocked gently in jars in an incubator for 6 days to keep the tissue alive and growing. Then the medium is replaced with a fresh nutrient containing one of the three polio virus strains. Each of the strains is grown separately. The infected tissue is then put back in the incubator for 4 days before harvesting into 5-gal. bottles. It is next passed through three filters of increasing fineness.

Finally, the virus is "killed" with a mild formaldehyde solution. The killing process is tricky. The virus must be inactivated only as to its disease-causing effects . . . not its antibody-producing effects.

The product as it emerges from the final test (on more monkeys) is a red liquid that is bottled in 1-cc. vials. The process from monkey to vial requires 90 days.

Several large U. S. pharmaceutical houses are now experimenting with mass production techniques, and it is hoped that present time requirements can be cut.

Cast-In-Place Sewer Has Plastic Lining

Digested from Engineering News-Record, Mar 17, p42—A mile and a quarter of 8½-ft.-dia. semi-elliptical concrete sewer is being constructed in Los Angeles with plastic lining protecting all but the invert. The lining is placed on the outside of the forms before concreting. Next, steel reinforcing for the structure is positioned. During concreting, the forms are thoroughly vibrated to assure embedment in the concrete of the plastic lining's T-shaped ribbing.

Length of the line and its flowing only part full most of the time indicated need for plastic-lining protection of the concrete to prevent damage from sewer gases. The material, known as Amer-Plate T-Lock, is a polyvinyl chloride plastic made by Amercoat Corp. (South Gate, Calif.)

T-extensions of the ribbing, spaced at 2½-in. intervals, are embedded in the concrete, making the plastic an integral part of the finished structure.

These Methods Help Fix Vendor's Quality

Digested from Factory Management & Maintenance, Mar, p126—Many companies face the problem of controlling vendor quality. Good methods meet the problem head on. Here are a few:

- Have at least two sources of supply for important purchases.
- Prepare a plan for incoming inspection. The ideal setup provides the minimum inspection needed to keep proving that the vendor remains reliable.
- Agree on what is vital and what is trivial in product characteristics. In other words, classify the quality characteristics as to importance.
- Agree on what the important quality characteristics really mean.
- Agree on tolerable quality vendors. Find out what is the maximum level of allowable defects in the inspected sample.
- Establish vendor's quality capability.
- Arrange to exchange data with your vendor.

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SINGLE-ELECTRODE GUN spot-welds stainless-steel meat tray to bracing underneath. Welds are smooth.

OPERATOR is spot-welding the steel top of a large cabinet. Portable gun saves handling of heavy workpiece.

Gun Spot-Welds from One Side

Faster fabrication of large complex assemblies, reduced jigging and fixture costs, high joint strength are the benefits of one-side welding

DIGESTED from Product Engineering, Apr, p180—Often spot welding with double electrodes is prevented by lack of access to both sides of the workpiece. In such cases, gas-shielded tungsten-arc spot welding, with a portable gun that holds the electrode for application to one side of the work only, opens up interesting design possibilities.

The electrical circuit is completed by attaching the positive lead from the welding machine to the back piece at any convenient point. The arc produces a circular weld by localized fusion. Arc heat penetrates through the front piece into the back piece to obtain required fusion depth.

Joints that can be made include lap (the most common), square-groove butt, T and corner joints. Available equipment, such as that made by Air Reduction Co., can handle thicknesses of the front piece to about 0.125 in. The back piece can be any thickness within certain practical limits.

Weld strength depends primarily on spot diameter at the joining point and depth of fusion into the back piece. Seven factors affect spot diameter and fusion depth:

• **Current**—Increasing current generally increases fusion depth. When bottom part is heavy or a backing is used, weld diameter increases.

• **Weld Time**—Increasing weld time increases weld diameter and fusion depth.

• **Arc Length**—Increasing arc length decreases fusion depth but increases weld diameter. Excessive arc length produces poor results. It not only reduces fusion depth but also may produce radial cracks in the surface of welds made in some stainless steels.

• **Shielding Gas**—Helium produces greater fusion depth, while argon produces greater weld diameter. A helium-argon mixture produces best results for high-quality work with light-gage stainless steel. The weld section is about midway between helium and argon patterns. A flow of 6 cu. ft. per hr. is usually satisfactory.

• **Backup Support**—Welding can be done from one side with a backup plate if sections are stiff enough to withstand gun pressure. Thin parts need support. More heat is needed with a backup plate. A copper plate is preferred as it permits higher heat on medium-thick parts to get larger welds without excess fusion depth.

• **Material**—Weldability of different materials varies with their thermal conductivity because of the rate of heat transfer from front to back pieces. Surface conditions too affect heat transfer. Oil, dirt, grease, scale, paint prevent good contact, decrease heat transfer, reduce weld strength.

• **Fit Up**—Firm contact is needed between pieces to produce a good weld. Scale, burrs, anything holding pieces apart prevent heat transfer, may even cause molten metal to spread out between the parts.

When should the design engineer consider one-side spot welding?

1. To join two sections, where the front sheet is not over 0.060 in. in thickness.

2. When lack of access prevents resistance spot welding.

3. To replace other joining methods, such as plug welding or riveting.

4. To tack weld before final assembly of parts, thus eliminating jigs and fixtures.

5. When number of welds is too small to justify the expense of buying large resistance spot-welding equipment.

6. For multiple joints that would require readjustment of large work-

pieces under a resistance spot welder for successive spots.

Typical applications include welding of the 0.062-in.-thick top side of a stainless-steel meat tray (upper left, opposite page) to 0.125-in. stainless bracing. Spot welds are made with no indentation, need no subsequent finishing.

Former welding method required jigs, fixtures, and considerable handling time, as well as tack welds on the under side. Eliminating jigs and fixtures and reducing the finishing work stepped up production from 21 to 30 finished meat trays per hour.

The large display cabinet (upper right, opposite page) is a similar application. The operator is welding the 0.062-in. mild-steel top of the cabinet to the inside structural members made up of 0.094-in. material. Weld spacing is 3 in. Moving this large work-piece into position for resistance spot welding would not only be difficult but also lose considerable time that otherwise could be devoted to welding.

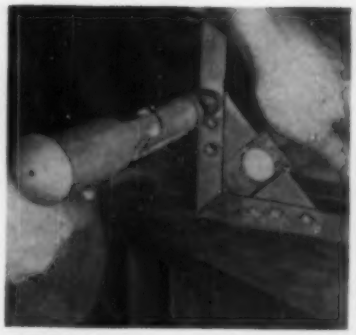
The joint design on an industrial cabinet (upper left) was made to take advantage of one-side welding. The result: a production boost from 4 to 36 per day.

The old procedure on the double-face cabinet door was to press metal pieces together, then seam-weld the inside corner 1½ to 2 in. on a 90° angle (all four corners). Build-up on the weld zone of 0.094 to 0.125 in. had to be ground off.

In the new method, the door edge is spot-welded from one side. Joint design to permit this change increased the size of the flange, installed a replaceable panel, and utilized corner reinforcements and reinforcing bars.

The redesign simplified assembly, reduced jigging time. Instead of taking six men 8 hr. to form, assemble, and complete a cabinet, it now takes three men 4 hr.

Tack welding is another important use of the one-side spot-welding method. A flange is being tack-welded (upper right) to a cylinder in assembly of blower housings. Tacking of the 0.062-in. mild steel parts is followed by arc welding. Fabrication time has been reduced from 17 min. to 3 min. on each housing by eliminating jigs and fixtures formerly needed to align parts for arc welding.



REDESIGNING corner joint for one-side welding raised output nine-fold. Also, polishing was eliminated.

TACK WELDING of flange to cylinder cut assembly from 17 to 3 min. Arc welding then follows.

Weld Sections Obtained under Typical and Ideal Conditions

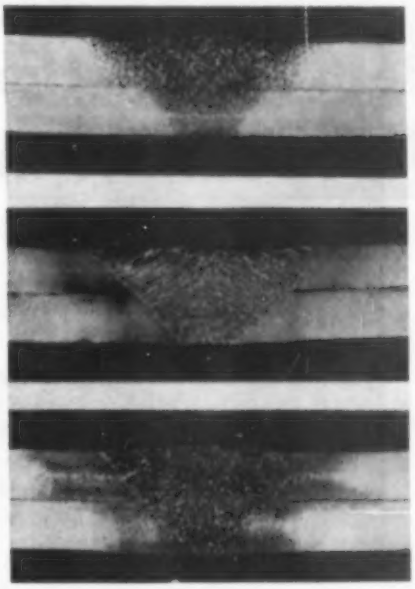
Effect of Shielding Gas on Weld Section

Material was cold-rolled steel, 0.038 in. front and back pieces, with no backing. A 3/32-in. thoriated tungsten electrode was used.

Gas: Helium
Current: 100 amp.
Time: 1/6 sec. (10 cycles)

Gas: 65/35% Helium-Argon mixture
Current: 125 amp.
Time: 1/6 sec. (10 cycles)

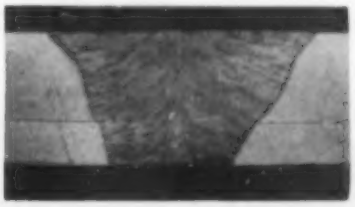
Gas: Argon
Current: 125 amp.
Time: ¼ sec. (20 cycles)

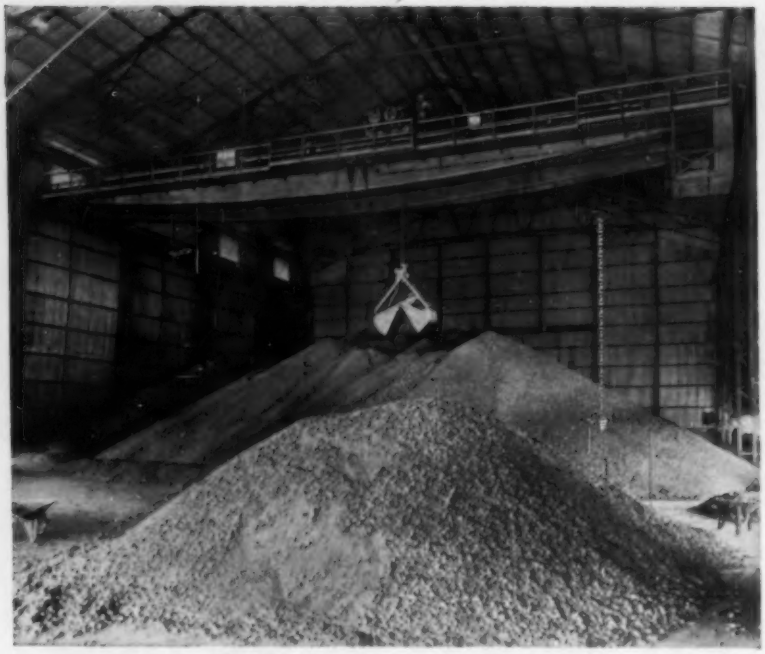


Effect of Post Heat and Variable Control on Weld Quality

Material was type 321 stainless steel. Front piece was 0.050 in. thick; back piece 0.038 in. A 3/32-in. electrode was employed.

Gas: 71/29% Helium-Argon
Welding Current: 95 amp.
Welding Time: 2½ sec.
Post-heat Current: 15-20 amp.
Post-heat Time: 2½ sec.
Gas Backing—Helium
Breaking Load—1,650 lb.





P&H Grab Bucket Crane in Johannesburg, South Africa, cement mill.

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Wherever efficient, low-cost bulk handling of materials is required, P&H Grab Bucket Cranes are preferred more than any other. Why? Because P&H is the only builder offering complete manufacturing and service responsibility. The entire crane, all components — electrical equipment included — are P&H-designed and built strictly for crane service. What better assurance of steady, economical performance could you ask?

More than 70 years of overhead crane experience with more cranes in service than any other builder proves the wisdom of talking with P&H first, whatever your crane requirements. All types and sizes of grab bucket and hook cranes. P&H also offers a full line of electric and chain hoists. Write for complete literature.

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Computer Network Ties Three Plants Together

Digested from Control Engineering, Mar, p12—The computer center of General Electric Co.'s aircraft-gas-turbine division (Evendale, Ohio) has an International Business Machines 701 high-speed electronic computer solving complex problems 24 hr. a day. Two other branches of GE funnel problems into this computer—one in Lynn, Mass., the other in Schenectady, N. Y.

Up to now, GE has been telegraphing problems and answers back and forth between Evendale and Lynn, and Evendale and Schenectady. And it has been renting extra time on a 701 in New York.

The plan is to turn this scramble into a tight network. IBM's Electronic Data Transceiver transmits data over an ordinary telephone line. With this machine GE engineers will be able to funnel their problems to either the Evendale or New York computer.

For the future, Transceiver networks may give smaller companies quick, reliable access to computers, which they could not afford to rent or buy but which they might need for an occasional problem. Or a larger company, with several scattered plants, could rely on one centrally located computer. It means much more efficient use of a powerful but costly tool.

Digest Readers . . .

. . . who are interested in management practices will be pleased with new additions to the list of magazines digested. Last month we added Banking, the journal of the American Bankers Association. This month the Harvard Business Review, published bimonthly by the Graduate School of Business Administration of Harvard University, joins our group. We welcome both as authorities in their fields and as excellent sources of the information needed for modern, efficient business management.

PERSONAL DIGEST

CHECK "ARTISTS"—raisers, forgers, and counterfeiters—cost the American public $400-million a year, a sum greater than the annual loss through fire. But check fraud isn't solely American; it's a world-wide business.

Anyone with a checking account is a target for check swindlers. They operate by altering the payee name, raising the amount, changing the date, counterfeiting existing checks, making up fictitious checks, forging signatures of drawer or endorser.

But you can protect your personal checks (and your bank account) by following these simple rules:

Keep your bank checks under lock and key. Guard your bank statements and cancelled checks. Destroy all spoiled checks. Never sign a blank check or make checks out to "cash" or "bearer."

Never write a check in pencil; it's too easy to change. Always use pen and ink or a check-writing machine that macerates the amount into the paper fibers in indelible ink. Begin writing at the extreme left of the name and amount lines to prevent easy alteration of name or insertion of additional figures. Draw a line through blank spaces.

Avoid flourishes in your handwriting. A complicated signature is easier to forge than a simple one. Some businessmen reserve a distinctive signature for checks and financial documents to make it harder for check forgers to get a sample signature.

✦ ✦ ✦

FEW BUSINESSMEN seem to know how to handle their leisure time. They try to apply the same rules to pleasure, experts in the field say, that they apply to their work. They can't relax. Most try to do too much—and lose more than they gain.

Hobbies should be selected for more than immediate enjoyment. They should develop with age and use so they can partially or completely replace your work when you retire.

Many adults are turning to hobby shops, handicraft counters. Model kits for ships, trains, airplanes are finding a ready market. Wood carving, copper etching, leather working are popular.

From Holland comes an improvement over the canvasses with numbered areas to be filled in by the amateur painter. Now he can fill in the areas, not with only one shade but with 36 shades he mixes from six selected colors.

Build-it-yourself hobbies are booming. One of the latest is an electronic organ. First you build it, then you learn to play.

✦ ✦ ✦

MUSIC while you pedal—a new bicycle with a built-in radio will give it to cyclists who crave entertainment. The radio operates off a power pack on the rear of the bicycle, will play up to 100 hr. on a set of batteries. It locks with a key to prevent theft and is claimed to be water- and shock-proof.

✦ ✦ ✦

ARTHRITIS SUFFERERS are promised new relief by new drugs. Metacortandracin, already on druggists' shelves, and meta-cortandralone, soon to be released, are three to five times as effective as cortisone and hydrocortisone. And they are virtually free of objectionable side effects.

The meta drugs are not cures. They relieve pain and swelling, assist in therapeutic measures. Metacortandracin has proved effective too in treating asthma, nephrosis, skin infections.

Personal Digest has been compiled from American Business, Business Week, Factory Management & Maintenance, and other sources.

ADVANCED ENGINEERING FEATURES

new

EXTRA-HIGH FLOW RATES

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announcing

A COMPLETE NEW LINE OF HONAN-CRANE OIL FILTERS

... the first in a series of important engineering developments by the **NEW** Corporation... HOUDAILLE-HERSHEY OF INDIANA, INC.

"F" Type FULL FLOW
For in-line installation at high flow rates—25 to 800 GPM. Uses new "FLO-PAC" pleated paper cartridge to remove particles down to one micron.

"M" Type MULTI-CARTRIDGE
Eleven sizes to choose from. Six types of cartridge refills including new "FLO-PAC" and "KLEER-PAC" available to give exact degree of filtration needed.

"B" Type BULK REFILL
For absolutely clean oil, bulk Cranite medium provides depth type purification. Bulk or cartridge type cellulose refills available for fine filtering.

All Models Have Quick-Opening Lids
Purifier lid is fastened with swing bolts. Lid swings back for easy access to refills.

Write for engineering bulletins and quotations on all three models.

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HOUDAILLE-HERSHEY OF INDIANA, INC.
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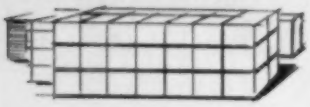

By being able to maintain flexible, fast shipping schedules, your shipments are not subjected to lengthy delays waiting for surface transportation. Your goods move faster and you get a quicker turnover of your money. Along with faster distribution, there is less chance of pilferage or damage, plus savings on insurance costs.

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This Incentive Plan . . .

. . . reflects the plant's productivity. British foundry raised casting output per man-hour, cut rejects sharply, raised hourly earnings over 50%

DIGESTED from Machinist, Apr 8, p617—Most incentive plans are based on individual or group effort. Other plans, which cover the whole factory, depend on its total output or are profit-sharing schemes.

A plan now gaining in popularity in the U. S. and also being tried in England and Germany is based on a more direct measure of productivity. Employees' earnings under this plan are directly proportional to the productivity of the company.

Called the Rucker share-of-production plan, it relates employees' earnings to the value added by manufacturing. Rucker (a U. S. management consultant) determined that of this total production value each year, a nearly constant proportion (39.4% for the U. S.) is paid out in wages. This same rule applies for other countries (and industries too), although the actual percentage figures may vary between countries. The incentive pay brings earnings to this ratio when productivity increases in the plant.

The Rucker plan, besides giving a measure of the increased productivity, also:

- Simplifies over-all cost control.
- Provides an incentive that stresses increased productivity.
- Stimulates suggestions from employes.
- Encourages cooperation for a common cause—operation of the business at a profit.

One British foundry that adopted the plan reports 17% gain in casting output, 47% reduction in rejects, 5% savings in raw materials, 2.8% reduction in the ratio of labor cost to sales value. Over the same period, the foundry advanced average hourly earnings 56%—a rate more than twice as fast as the general manufacturing increases.

The foundry, a jobbing shop making some 3,000 types of iron castings, based its standards for the Rucker incentive plan on sales and cost data for 5 years. Total product value was divided into two components: value created by materials and production value created by men, management, and machinery.

Production value, in turn, was divided into two parts: labor's share (factory hourly payroll) and management's share (salaries, overhead, profits). Labor's share over the 5-year base period averaged 40.17% of the production value. So the labor cost is held at this percentage as the total production value increases.

An increase in productivity then increases the employees' earnings. If the production value of any 1 month, for instance, is £1,000 above standard, employees are credited with 40.17% of that amount.

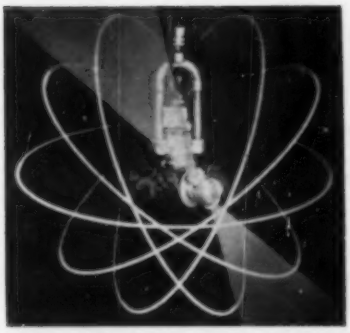
The share-the-production account, on the whole, is credited with 40.17% of the production value and debited with total regular pay. The net difference between total credit and total debit is the incentive pay added to the regular pay.

Earnings are distributed pro rata to eligible employees on the basis of total regular pay of each person. Each month, three-quarters of the credit is paid out. The remaining quarter is carried to a reserve account as a credit.

Should productivity fall in any month below standard, the deficit is charged to the reserve account. At the end of the year, the net balance is paid out to the employees.

The plan does not preclude regular-wage increases. But when a general raise is made, say of 10%, employees must step up production by 10% to continue earning the same percentage of incentive pay they earned before the raise.

An employee-management committee administers the plan's operation. It meets monthly, examines the previous month's performance. In its review, it looks at all detailed figures—on actual performance in relation to standard with respect to weight of castings produced, materials consumed, customer returns, scrap losses, and production value.



Cleaning Shaped Tanks

Digested from Petroleum Processing, Apr, p565—A rotary cleaning jet delivers two powerful streams of hot or cold water, with or without detergents, to clean entire inside surface of shaped tanks. The Rotor Jet, made by Sellers Injector Corp. (Philadelphia 30, Pa.), is lowered into tank by its supply hose. Jet head is air-powered.

Colorful Appliances

Digested from Electrical Merchandising, Mar, p249—When manufacturers of electrical appliances began turning out units in color just over a year ago, they opened the door to a series of complex problems:

- **No standarization** as yet on colors means that the buyer who has a "petal green" refrigerator made by Company "A" will have to buy a stove from Company "A" if she wants colors to be consistent.
- **Housewives resist** placing a pink refrigerator next to a standard white stove. And not enough buyers can afford to replace all units simultaneously.

Assembles Circuits

Digested from Control Engineering, Apr, p12—A new automatic machine fastens components to printed circuits. General Mills Inc., designed and built the machine. Called "Autofab," it consists of a row of bins that feed component parts to attaching heads operating over a wafer-carrying belt.

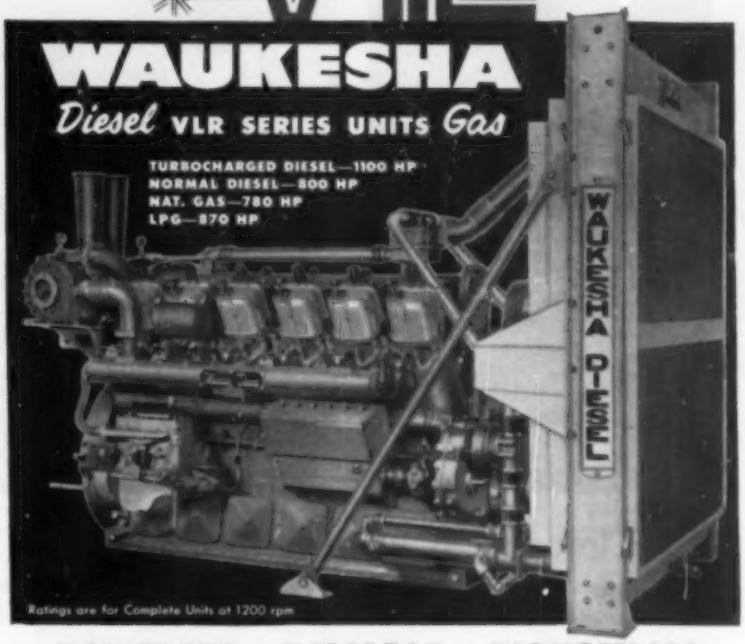
All the attaching heads operate simultaneously. As each printed circuit positions under a head, the conveyor briefly stops and the component is attached. This continues down the full line of heads until the complete circuit is built.

new V-12

WAUKESHA

Diesel VLR SERIES UNITS *Gas*

TURBOCHARGED DIESEL—1100 HP
NORMAL DIESEL—800 HP
NAT. GAS—780 HP
LPG—870 HP



Ratings are for Complete Units at 1200 rpm

POWERFUL • RELIABLE • ECONOMICAL

This powerful turbo-supercharged Waukesha is a twelve-cylinder, 60-degree vee, even firing, four-cycle, solid injection, overhead valve, compression ignition Diesel, of 8½-inch bore and stroke and 5788 cubic inch displacement. The connecting rod arrangement is of the side-by-side type; opposing pistons operating from a single wide-area crankpin.

The turbocharged Diesel unit shown above develops approximately 1100 hp at 1200 rpm with radiator, fan, and air cleaners. Without turbocharging, the normal Diesel complete unit maximum rating is 800 hp. The propane-butane model of this V-12 series develops 870 hp. Bare engine ratings of all models are higher. Response to throttle and load requirements is quick and smooth, with a fast surge of reserve power for emergency and overload demands.

Tremendously powerful, remarkably rugged, this V-12 engine is designed for simplicity and reliability. Major parts are interchangeable between right and left cylinder banks. Main and rod bearings are easily accessible. Strength, precision and balance are built into all elements of the power train, from pistons to flywheel. Supporting members are designed for extreme rigidity and perfect alignment of moving parts.

Send for illustrated Bulletins 1663 (turbocharged) — 1664 (normal Diesel) — 1656 (gas).

266

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.
New York • Tulsa • Los Angeles

NEW PRODUCTS

Mack Introduces Vertical-Rising Cab on New Truck Models for 1955

Cab-over-engine trucks have been popular with users since they first appeared over 50 years ago. But they have not been popular with mechanics until recent years. The reason: they have been extremely difficult to service. With the first models, the mechanic had to tear the cab apart to get at the engine.

In the new cab-over-engine design, the cab rises vertically, either manually or hydraulically. The hydraulic lift is optional. As a safety feature, a special lock holds the cab in its raised position.

Mack Trucks Inc., the manufacturer, says that nothing has to be disconnected before the cab is raised.

The company claims two new features for the model:

• **Space Gain**—A vertical-rising cab permits repairs and maintenance in close quarters where other systems would require more space. Overhead, the cab needs only a foot more clearance than a hinged cab.

• **Shorter Cab**—Designing the cab to lift straight up has made the cab shorter by one foot than other cab-over-engine types. This gives the driver a considerable advantage in city driving or handling the truck in areas where close parking and maneuvering are necessary.

Mack is producing the truck in four-wheel and six-wheel models. —**Mack Trucks Inc., 350 Fifth Ave., New York 1, N. Y.**

Welder for Job Shops

A new general-purpose alternating-current welder for job shops and light industrial applications covers a current range of 25 to 295 amp. The unit is particularly designed for such jobs as tack welding at high currents and steady welding at moderate currents. The welder provides a 50% duty cycle in the normal welding range of 200 amp. with somewhat lower duty cycles when higher settings are used.

A low-range open-circuit voltage of 75 volts provides easier starting and facilitates use of low-hydrogen and stainless-steel electrodes. — **International General Electric Co., 570 Lexington Ave., New York 22, N. Y.**

Corrosion-Resistant Pumps

Three new chemical pumps, 1, 1½ and 1½ in. in size, have the advantage of the high cut-water or "tongue" of the volute, which makes the unit self-venting and minimizes formation of air pockets. Pumping efficiencies are high because of the large diameter of the single-shroud-type impeller.

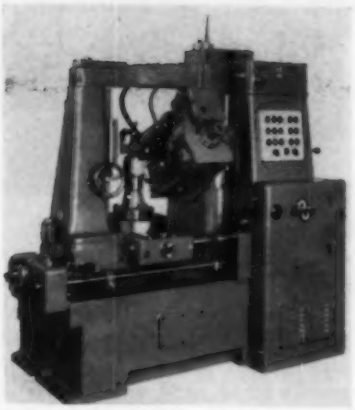
The pumps are particularly adaptable to vacuum filter and evaporator applications in which liquid must be discharged under vacuum as high as 25 in. of mercury.—**Dorr-Oliver Inc., Stamford, Conn.**

Skid-Shovel Attachments

Standard line of skid shovels, intended for front-end shoveling, ranges in capacity from ¾ to 3 cu. yd. They are for use with International TD-6, TD-9, TD-14A and TD-18A crawler tractors.

The shovel can be converted into a bullclam shovel, a bulldozer, a skid shovel, or a clamshell by merely placing a selector lever in the shovel position desired. The shovel shown is operating as a bullclam.

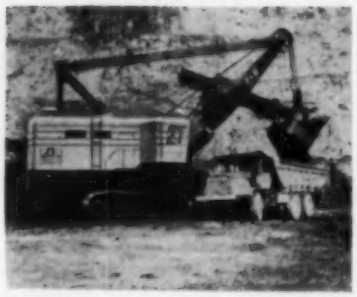
As a bullclam, the shovel is suited for small sanitary landfill work. With clam open, it becomes a bulldozer. For loading dirt, it features both forward and bottom dump. As a clamshell, the shovel is closed hydraulically over the material.—**International Harvester Export Co., 180 N. Michigan Ave., Chicago 1, Ill.**



High-Speed Gear Hobber

Designed for mass production of spur and helical gears up to 9½ in. in dia., hobber features 180- to 540-rpm. spindle speed, feed range of 0.035 to 0.197 in. per table revolution, 12-hp. two-motor drive. Maximum diametral pitch hobbed is 6.35 Maximum gear diameter is 9½ in. Equipment includes change gears, arbors, gages.

The hobber can be equipped with automatic-cycle control. It is then started by pushbutton; the rest of the cycle—table and hobbing slide feed, etc.—is automatic. The automatic cycle is controlled by simple electro-mechanical combinations.—**Maschinenfabrik Lorenz A.-G., Ettlingen-Baden, Germany.**



Electric Shovel

Designated P&H model 1800, new heavy-duty electric mining shovel has an 8-cu. yd. capacity and features electronic control for all operating functions. Other features include centralized alternating-current motor drive, widespread boom foot with rubber shock absorbers, and externally-mounted propel brake.

Electronic control provides rapid signal response from controllers, allowing better coordination of shovel motions. Stepless controllers with their finger-tip ease of movement permit the operator to work more efficiently. Model 1800 also features a hoist drive that transmits power electro-magnetically without wear.—**Harnischfeger International Corp., Milwaukee 46, Wis.**

Washless Photo Chemicals

Chemicals kit for rapidly processing oscillographic recording paper will be of particular use in petroleum, automotive and aircraft industries. It eliminates the final water bath, increases production by 50%, permits use of continuous processing equipment that needs no plumbing. The ready-to-mix kit consists of a developer, a short-stop, and a stabilizer.—**E. I. du Pont de Nemours & Co., Wilmington, Del.**

Rubber-Tired Scraper

New rubber-tired motor scraper, designated TS-360, weighs 49,000 lb., has a 15-cu. yd. struck capacity and a 20-cu. yd. heaped capacity, and features a new 280-hp. diesel engine. New operating advantage is selective steering.

The new engine is part of a whole new power train that offers more rim pull at all speeds for better loading, hauling, and spreading performance. The tractor main frame is of the unit-construction type. It facilitates easy removal and servicing of both major and minor assemblies.—**Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.**

Versatile Vibrator Does Many Jobs

Model 8GV21 concrete vibrator combines high performance, broad versatility, and low cost. Besides vibrating concrete, the tool can be fitted with attachments for surfacing, sanding, wire-brushing, grinding, grouting, pumping, drilling, firefighting, buffing, and polishing. Its 2-hp. gasoline engine is mounted on a swivel base for ease of handling. The unit weighs only 38 lb. It is available with 12 ft. of shafting and a 2¼-in.-dia. by 14-in.-long vibrator head.—Mall Tool Co., 7725 S. Chicago Ave., Chicago 19, Ill.

Clark trucks at Netherland Statemines

Make money 4 ways

Millions of kilograms of CAPROLACTAM (a basic material for textiles) are handled annually by Clark trucks at Netherland Statemines—making money by reducing costs through:

1. **Increased** tons handled per man hour.
2. **Multiplying** use of existing storage area through tiering.
3. **Eliminating** damage to drums through mechanized unit load handling.
4. **Reducing** maintenance and operating costs by using quality built advanced design Clark Equipment.

Netherland Statemines installed Clark trucks with the counsel and assistance of Koopman & Company, a member of the world-wide organization of Clark distributors. These materials handling specialists can show you the way to cut your handling costs, increase your operating efficiency through the use of Clark equipment. Consult your local Clark distributor or write:

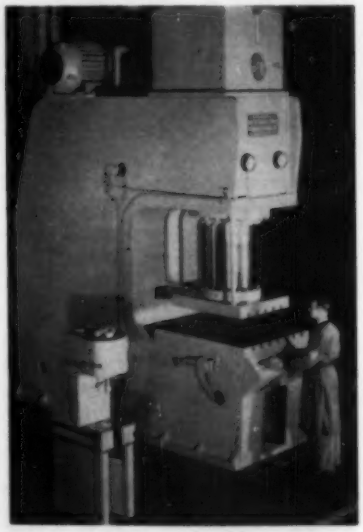
CLARK EQUIPMENT

EXPORT DIVISION
CLARK EQUIPMENT COMPANY
Battle Creek 73, Mich. U.S.A.
Cable Address Clarktruc

Device Dumps Loads for Straddle Carriers

A hydraulically operated device for use with straddle carriers can pickup box-like containers for gravel, scrap, sand, and other bulk materials, transport them any distance, and dump them.

The unit is built from steel plate and heavy-wall seamless-steel tubing. Arms are raised by two hydraulic chain hoists to a maximum height of 11½ ft. Load lifting capacity is 16,000 lb.—**Clark Equipment Co., Ross Carrier Division, Benton Harbor, Mich.**



Low-Tonnage C-Presses

New C-frame press line includes 11 models ranging in capacity from 2 to 200 tons. The large press on the right is a special 500-ton model made for Aluminum Co. of America. The C-presses are adaptable to a score of uses including assembly work, trimming, marking, compacting, blanking drawing, broaching, and straightening.—**Hydraulic Press Mfg. Co., Mount Gilead, Ohio.**

New Product Briefs

Self-priming Pump—New Flomax 8, 2-in. self-priming centrifugal pump delivers 8,400 gal. per hr. at 25-ft. total head including a 10-ft. suction lift. It is cast iron and weighs only 74 lb. The pump is powered by a four-cycle Briggs and Stratton engine with remote throttle control. It has super-hard greaseless mechanical seals, removable flanges, and replaceable wear plates.—**Marine Products Co., 515 Lycaste St., Detroit 14, Mich.**

Hand-operated Mimeograph—Color duplicating and use of new contact-drying inks are simplified on new economy-priced, hand-operated model 432 mimeograph machine. Other features of the machine are an automatic-inking enclosed cylinder, ink-recovery system, hairline registration, and automatic dual roll feed.—**A. B. Dick Co., 5700 W. Touhy Ave., Chicago, Ill.**

Breaker Enclosure—A new nodular cast-iron enclosure for AB-1 circuit breakers is designed for use in hazardous locations. The material is said to permit stronger construction, while achieving a weight reduction of 45% over conventional cast-iron breaker enclosures. — **Westinghouse Electric International Corp., 40 Wall St., New York 5, N. Y.**

Tests Fan Systems—Mark 1 portable Airflow tester consists essentially of three manometers of different ranges together with barometer, pilot tube, other accessories. Use: to measure air flow in heating, air conditioning, processing, power plants.—**Airflow Developments, The White House, New Road, Booker, High Wycombe, Bucks, England.**

Platform Scale—New 500-lb. floor-level scale weighs flowing powdered materials electrically. It incorporates a compression-type load cell with bonded-resistance-wire strain gages as load sensing elements. Instrumentation includes indicators, recorders, and necessary control equipment. —**Baldwin-Lima-Hamilton Corp., Lima, Ohio.**

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MANAGEMENT REPORT

A possible method of predicting business-cycle turning points by forecasting inventory changes was recently disclosed by the Business Executives Research Group. Because inventory changes are a major element in the business cycle, the group conducted a test to determine if individual firms could accurately predict their own inventory changes. Test results suggested that individual firms do have the ability to predict short-run movements in their own inventories.

Among the conclusions in the group's report are:

- Although changes in business inventories have never reached even 5% of the gross national product, they exert a great influence on the level of business activity because of the violence of the changes.
- The traditional method of forecasting inventory changes based on historical inventory-sales ratios is unreliable.
- In regard to the costs of inventory holdings, the report had this to say: "The conclusion seems inescapable that most firms have a very limited knowledge about the quantitative importance of these costs. It is clear that this is an important area for business study . . . inventory policy based on the implicit or explicit estimate of carrying charges of 6% would be very wasteful if the actual charges were three or four times as great.
- The report further stated: "The development of better inventory data by levels of distribution would make for an improved inventory control."—Am Business, Mar, p32

Why do business's fail? Dun & Bradstreet, Inc., market-research and credit-rating organization, has some of the answers. One factor stands out in every study of business failures. It is lack of management experience or lack of aptitude for running a business. The incident that discloses this weakness may be a shift in customer preferences, a decrease in demand, rising costs, or "general business conditions." And the significant characteristic common to this weakness is that it usually shows itself long before the business becomes a failure statistic. Nearly nine out of ten failures fall into this category. The remaining failure is usually caused by either neglect or fraud.

How to break into a stabilized market for an established chemical was the problem facing Allied Chemical & Dye Corp.'s Barret Division. The chemical: nylon. The solution: offering a modified type, called Plaskon nylon 8200, with special properties—high molten viscosity and controllable crystalline structure. But distribution had to be carefully planned.

Sales approach will center on molding applications rather than textiles. Added to the market offered by customers for its resins will be the interest generated by the Barret traveling industrial designer. For 2 years, he has talked Plaskon nylon to other industrial designers. Now salesmen will solicit design and engineering groups. —Chem Wk, Apr 6, p64

If you are planning to have some equipment built, you can get better equipment at lower costs by following some common-sense rules. Specify the job you want done, not how the equipment should be built. Give complete information about the product and process operation. Keep specifications as loose as possible so as not to exclude possibly better equipment.

More rules: Don't rule out an improved process or engineered package just because you never heard of it. Avoid the extravagances of overdesign and tolerances too close. Consult manufacturers' representatives for advice. And, above all, keep an open mind, even after specifications are drawn up.—Chem Wk, Feb 26, p40

Quickest indicator of good or poor human relations is the degree of consideration shown your workmen when taking visitors through your plant. When you stop by a machine to point out some technical feature, do you introduce the operator? Or at least acknowledge him by name? On entering a department, do you have the foreman meet your guest? Or do you brief the foreman on the purpose of your visit?

These may seem like little things. But, in the eyes of your subordinates and of the rank-and-file, they are a measure of how much you care about them. When you act as if they were just another part of the machinery, no one will be able to hide the fact as to where he fits. But, when you take time to get your people into the picture, they are ready to believe you are proud of them. —Factory, Apr, p105

NEW FREE CATALOGS

Metal-processing Machinery — Information on a complete line of laboratory and production rolling mills, rotary gang slitters, levelers, and accessory equipment is given in bulletin 210.—Stanat Mfg. Co., 47-28 37th St., Long Island City 1, N. Y.

Radio Transmitter-receiver—Catalog, available in English and Spanish, describes complete line of model 1006 100-watt-output radio-telephone receivers.—G & M Equipment Co., Inc., 7315 Varna Ave., North Hollywood, Calif.

Milling and Grinding Machine—Model 104 templet and cam machine for milling or grinding external and internal contours, is described in circular 579.—Pratt & Whitney, Div. of Niles-Bement-Pond Co., West Hartford 1, Conn.

Clinker Breaker—The first clinker breaker, built by Allis-Chalmers for use with the company's air-quenching clinker coolers, is designed to crush chunks of clinker discharging from the cooler.—Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Magnetic Amplifiers—Booklet 52-600 explains the basic theory under-lying magnetic amplifiers, gives information necessary for application, and describes operating characteristics.—Westinghouse Electric Intl. Corp., 40 Wall St., New York 5, N. Y.

Milling Machine—Catalog contains complete information on the "Centec" 3, automatic-cycle, electronically controlled, production-type milling machine.—Central Tool & Equipment Co. Ltd., Centec Works, Hemel Hemstead, Herts, England.

Wire-fastening Machines — Catalogs describe Saranac wire staplers for the manufacture of boxes, crates, and baskets for shipping industrial products, fruits, and vegetables.—Saranac Machine Co., PO Box 418, Benton Harbor, Mich.

Investment Castings — Folder illustrates and describes the making of investment castings and the advantages derived from this method of producing intricate and small component parts.—Deloro Smelting & Refining Co. Ltd., Deloro, Ontario, Canada.

Lift-truck Operation — Designed for easy reading, booklet 1214 is packed with information about the operation of a lift truck, preventive maintenance, safety, and basic materials handling.—Hyster Co., 1800 N. Adams St,. Peoria 1, Ill.

Angle Plates and Chucks—Catalog 812 describes construction and applications of sine angle plates and magnetic chucks—valuable tools in setting up angular work for machining or inspection operations. — Taft-Peirce Mfg. Co., Woonsocket, R. I.

Screening Equipment — A complete line of screening equipment for efficient removal of solids from water, sewage, and industrial waste is described in book 2587.—Link Belt Co., 233 Broadway, New York 7, N. Y.

Torque Converters — Illustrated brochure depicts models, shows attachments for specific adaptations, and describes with cutaway drawings the construction features of Torcon torque converters.—Clark Equipment Co., Battle Creek 73, Mich.

Stainless Steel — Complete information on the architectural uses of stainless steels in building construction is given in bulletin 15-H-1.—Republic Steel Corp., 405 Lexington Ave., New York 17, N. Y.

Automation Systems—Catalog AU-1154 contains application and engineering data on control units for automatic machine control, classifying and segregating processes. — Sheffield Corp., Dayton 1, Ohio.

Heavy-duty Compressor — Complete information on the Airmaster 85, a heavy duty compressor designed for smaller jobs, is given in bulletin C-21. —LeRoi Div., Westinghouse Air Brake Co., Milwaukee 14, Wis.

Industrial Meters—Detailed information on Rockwell Rotocycle stainless-steel industrial meters for corrosive liquids is given in bulletin O.G. 406-R1.—Rockwell Mfg. Co., 400 N. Lexington Ave., Pittsburgh 8, Pa.

"Aluminum Bridge Railings"—Booklet presents a wealth of information on the use of aluminum in this rapidly expanding field.—Reynolds Metals Co., Export Div., 19 E. 47th St., New York 17, N. Y.

Hydraulic Fluid—Booklet contains detailed information on Pydraul F-9, a fire-resistant industrial hydraulic fluid.—Monsanto Chemical Co., 1700 South Second St., St. Louis 4, Mo.

Fuse Cutouts — Booklet GEA-6208 covers design features, application information, technical data, dimensions, and ratings on a new line of enclosed fuse cutouts.—International General Electric Co., 570 Lexington Ave., New York 22, N. Y.

Hard-facing Alloys — Characteristics and typical industrial applications of Colmonoy alloys are described in manual No. 77. — Wall Colmonoy Corp., 19345 John R St., Detroit 3, Mich.

Glass Block—A new glass block with Suntrol, a pale green diffusing screen that helps reduce the intensity of glare and heat, is described in booklet GB-103. — Pittsburgh Corning Corp., 1 Gateway Center, Pittsburgh 22, Pa.

Foundation Pipe — Bulletin 542 describes the characteristics of foundation pipe for piling and illustrates its application in the construction of bridges and buildings.—Taylor Forge & Pipe Works, PO Box 485, Chicago 90, Ill.

Lubricating Oils—The development of more efficient lubricating oils to get many years of reliable service from diesel engines is related in booklet 12440.—Caterpillar Tractor Co., Peoria, Ill.

Test Apparatus — 1955 Catalog contains descriptions and illustrations of over 1,250 items of apparatus for engineering tests of soils, concrete, asphalt, and construction materials.—Soiltest Inc., 4520 West North Ave., Chicago 39, Ill.

Vacuum Dryer—Bulletin describes the Conaform vacuum dryer, recommended for drying temperature-sensitive and easily-oxidized materials.—Patterson Foundry & Machine Co., East Liverpool, Ohio.

Switches—Catalogs 62 and 75 contain detailed information on basic and subminiature snap-action precision switches. — Minneapolis-Honeywell Regulator Co., 2747 Fourth Ave. S., Minneapolis 8, Minn.

Masonry Drills — Regular spiral and Fastlead masonry drills and sets are described in illustrated circular.—Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich.

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. . . to the manufacturers for the free literature announced on this page. Tell them definitely which catalog you want—specify the catalog number or its name when either one is given. And mention that you saw the offer in the McGRAW-HILL DIGEST.

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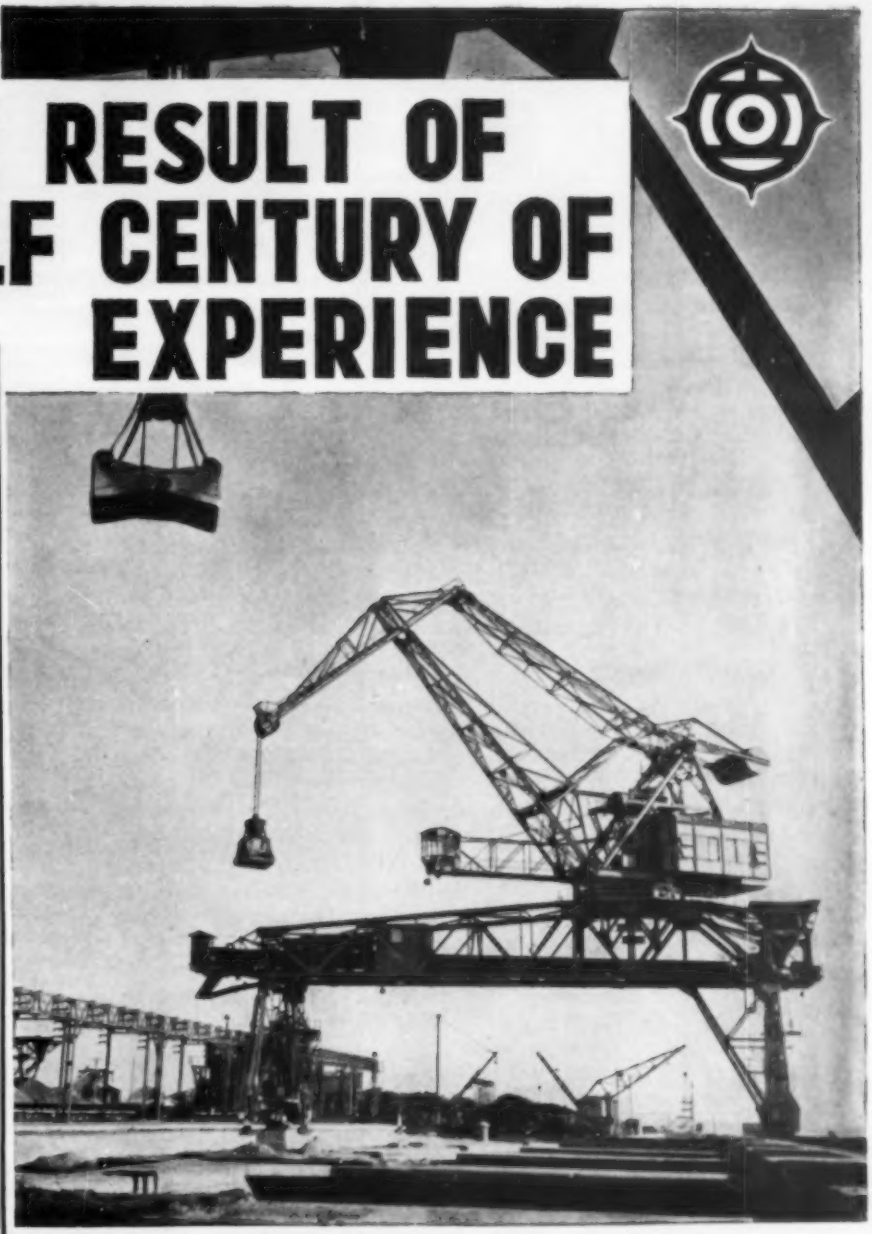

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Information Offered

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Acetic acid . . . a chemical vital to the production of consistently-fine cellulose rayon. Shawinigan Chemicals Ltd.—p37.

Agricultural chemicals provide efficient, low-cost protection for your crops. Diamond Alkali Co. —p1.

Bethlehem plants supply a steady flow of steel for world markets. Bethlehem Steel Export Corp.—p6.

Board-forming machines produce insulating and hard board from many kinds of material. Dorr-Oliver Inc.—p36.

Clark trucks cut your materials-handling costs and increase your operating efficiency. Clark Equipment Co.—p46.

"Controlled Flow" conveying systems work smoother . . . pay profits sooner. Rapids-Standard Co.—p25.

Copper-tubing catalog will help you develop tubing applications. Bundy Tubing Co.—2nd cover.

Copying machine produces clean, dry copies of anything typed, ruled, written, or drawn. General Aniline & Film Corp.—p35.

Cut manufacturing costs with new cost saving gear-shaving machines. National Broach & Machine Co.—4th cover.

Electro-loaders raise and lower heavy loads . . . quick and easy. Globe Hoist Co.—p20.

Grab-bucket cranes provide fast, dependable handling in all phases of cement production. Harnischfeger Intl. Corp.—p40.

Grain processing and storage plants were prefabricated for fast field erection. Black, Sivalls & Bryson Inc.—p24.

Hack-saw blades for every metal-cutting job. Victor Saw Works Inc.—p26.

Machine Tool Show will feature the latest methods in metal-working. National Machine Tool Builders' Assoc.—p4.

Modern processing machines lower the cost of metals and minerals. Allis-Chalmers Mfg. Co.—p8.

Oil filters have advanced engineering features and extra high flow rates. Houdaille-Hershey of Indiana.—p41.

Planning a plant can be a complicated process. Booklet tells the story of Ebasco and its services. Ebasco Services Inc.—3rd cover.

Precision boring machines for small and medium-size parts. Ex-Cell-O Corp.—p47.

Stellite paper slitters last longer . . . cut clean longer. Deloro Smelting & Refining Co.—p34.

Turbocharged diesel engine is powerful, reliable, and economical. Waukesha Motor Co.—p43.

Unitaire air conditioning can put a stop to "hot-weather slowdown." Westinghouse Electric Intl. Co.—p48.

Variable speed drive cuts space requirements up to 50%. Link-Belt Co.—p2.

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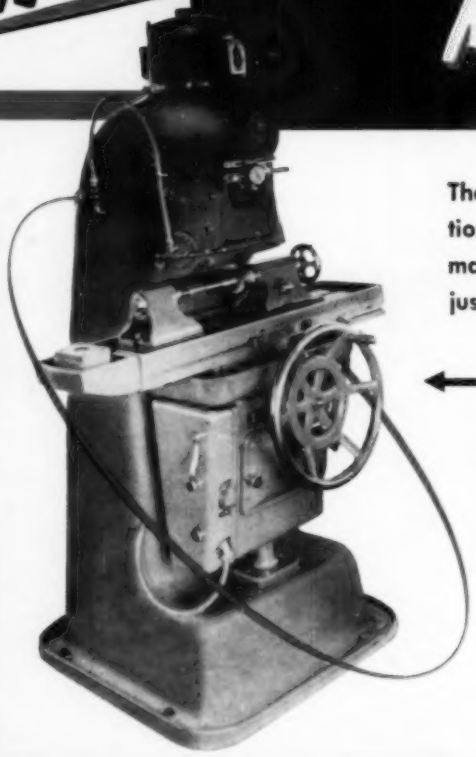

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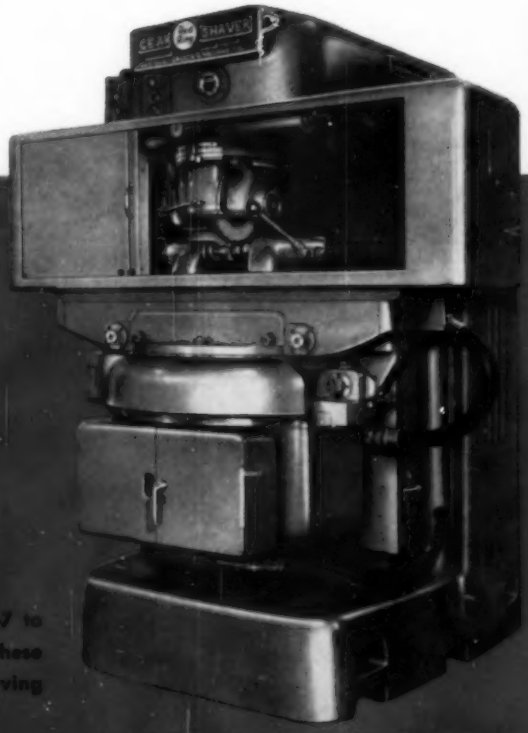

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